DNA 1251-1-FX

# COMPILATION OF LOCAL FALLOUT DATA FROM TEST DETONATIONS 1945-1962 **EXTRACYED FROM DASA 1251**

Volume I -Continental U.S. Tests

Co
General Electric Company-TEMPO
DASIAC
816 State Street Santa Barbara, California 93102

A079318

1 May 1979

Extract

CONTRACT No. DNA 001-79-C-0081

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Prepared for

Director DEFENSE NUCLEAR AGENCY Washington, D. C. 20305

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COMPILATION OF LOCAL FALLOUT DATA FROM TEST DETONATIONS 1945-1962 EXTRACTED FROM DASA 1251.	Extract
Volume I—Continental U.S. Tests,	DASTAC-SR-179-YOL
Howard A. Hawthorne Editor	DNA 001-79-C-0081
9. PERFORMING ORGANIZATION NAME AND ADDRESS General Electric Company—TEMPO DASIAC, 816 State Street Santa Barbara, California 93102	10. PROGRAM ELEMENT, PROJECT, TAS ANEA BOOK UNIT NUMBERS Subtask P99QAXI 708-09
Director Defense Nuclear Agency	1 May 79
Washington, D.C. 20305 619 619 14 MONITORING AGENCY NAME & ADDRESS(II different from Controlling Office)	619 15. SECURITY CLASS (of this report)
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#### **PREFACE**

This report has been prepared to serve as an unclassified source of information and data concerning the atmospheric nuclear test program conducted by the United States prior to 1963. The information contained herein was reproduced directly from the classified versions of the DASA 1251 series of reports. The classified material which was deleted to prepare this report was in accordance with the requirements of the Atomic Energy Act of 1954 and would not contribute to an understanding of the radiation interactions with personnel. All fallout plots and radiation contours are presented exactly as they appeared in the classified version of DASA 1251.

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#### **INTRODUCTION**

The objective of this report is to provide a ready reference of fallout patterns and related test data for those engaged in the analysis of fallout effects.

This compilation was extracted from DASA 1251 "Local Fallout from Nuclear Test Detonations" (U) Vol. 2 "Compilation of Fallout Patterns and Related Test Data" (U) Parts 1 through 3. DASA 1251 Vol. 2 was the work of Manfred Morgenthau, Harvy Meieran, Richard Showers, Jeffrey Morse, Norman Dombeck, and Arnoldo Garcia of the U.S. Army Nuclear Defense Laboratory under Defense Atomic Support Agency (now Defense Nuclear Agency) sponsorship.

Although local (early) fallout is emphasized, the data presented will be useful to those studying world-wide (delayed) fallout as well. In this report local fallout is defined as all fallout which consists principally of the larger particles that are deposited within 24 hours after the detonation. World-wide or delayed fallout is defined as fallout which consists of very small particles which descend very slowly over large areas of the earth's surface.

Data resulting from each U.S. detonation are presented chronologically. For each detonation, the basic information useful for an interpretation of the fallout data is tabulated first. This is followed by both on-site and off-site fallout patterns where available. A graph of the growth-rate of the cloud and stem is presented next. Wind speed and direction are then tabulated as a function of altitude, and hodographs are drawn from these data.

#### EXPLANATION COMMENTS ON DATA PRESENTED

#### Fallout Patterns

One or more fallout patterns are given for each event, except for those shots for which no significant residual radiation was observed downwind of GZ or for which no patterns were found in the literature. In the remarks included on the basic data sheet for each shot, the individual fallout patterns are discussed briefly; some comments are made for those shots for which no patterns were available. The doserate contours for the fallout patterns have been drawn to show the gamma dose rate in roentgens per hours, three feet above the ground, in terms of the one hour after burst reference time. The t<sup>-1,2</sup> approximation was used when no actual decay data was available to adjust radiation measurements to the one hour reference time. It is important to recognize the H+1 hour is used as a reference time, and that only the contours from low yield weapons are complete at one hour after burst. For high yield weapons, fallout over some parts of the vast areas shown does

not commence until many hours after the burst. The time of arrival of fallout is indicated on some of the fallout patterns by "dot-dash" lines. The time lines are intended to give only a rough average arrival time in hours as estimated from the wind reports and the available monitoring information.

#### Induced Activity Patterns

The contamination resulting from low air bursts is due primarily to the activity induced by neutrons which are captured by certain elements in the soil, notably sodium, manganese and aluminum. The resulting radiation field is circular and covers a limited area about ground zero. Weather conditions have very little influence on the location or shape of the induced radiation pattern. However, increasing the moisture content in soils can increase the induced activity levels. The rate of decay of the induced radiation field is different from the decay of fission products and depends on the composition of the soil over which the weapon was detonated. For Nevada soil, the sodium and manganese composition generally varies by a factor of 1.4 to 2 and the aluminum composition varies by a factor of 3 to 7 within and between test areas. For most induced activity patterns in this report, a general neutron-induced decay curve for Nevada soil was used to extrapolate the observed dose rates back to H+1 hour. For a few induced activity patterns, Na24 decay is used to extrapolate the observed dose rates to H+1 hour. This decay rate is not strictly applicable but it closely approximates the observed decay.

#### Wind Data

The tables of wind down give surface and upper air winds for heights up to at least the top of the nuclear cloud. These data are presented for times as glose to shot time as possible and for several times after shot. Directions are in degrees from which the wind is blowing, and are measured clockwise from north. Verocities are in statute miles per hour. The height of the tropopause as must lime is given when available. Atthough the metaprological data three caken in close proximity to ground zero, they do not necessarily represent the wind field downwind from ground zero in space and time.

The hodographs are drawn for a constant balloon rise rate of 5,000 ft/hr and are presented for allustrative purposes only. The fall rates of particles vary considerably with altitude; therefore, errors will result from the use of a constant fall-rate hodograph for fallout prediction. In general, particles in higher altitudes levels fall faster and the percentage change in the falling rate is greater for larger particles. The numbers on the hodographs represent altitudes in thousands of feet. The associated points represent the locations on the surface where particles having a constant fall-rate of 5,000 ft/hr could land if they originated over (Z at the altitudes shown. The letter S on the hodographs stands for "Surface" and the number next to it in parenthesis (for the Nevada shots) is the site elevation of ground zero in feet above MSL.

# OPERATION TRINITY

16 Jul 1945 16 Jul 1945 TIME: 0529

1229

TOTAL YIELD: 19 kt

FIREBALL DATA:

Time to 1st minimum: MM Time to 2nd maximum: NM Radius at 2nd maximum: NM Sponsor: LASL

SITE: 57 miles Northwest of

Alamogordo, New Mexico Inates: 33° 40' 31" N 106° 28' 29" W Coordinates:

Site elevation: 4,624 ft

HEIGHT OF BURST: 100 ft

TYPE OF BURST AND PLACEMENT: Tower burst

CLOUD TOP HEIGHT: 35,000 ft MSL CLOUD BOTTOM HEIGHT: 10,600 ft MSL

CRATER DATA: Diameter: 1,100 ft

Depth: 9.5 ft

# REMARKS:

Extensive surveys were made four hours after the shot with beta and gamma survey meters. The measurements were adjusted to H+1 hour by using the t-1.2 law to approximate the decay.

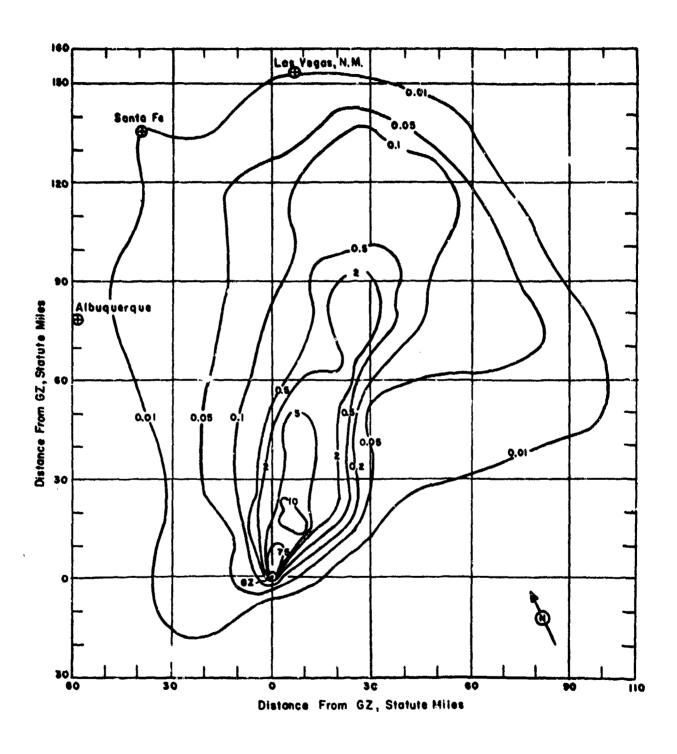


Figure 1. Operation TRINITY off-site dose rate contours in r/hr at H+1 hour.

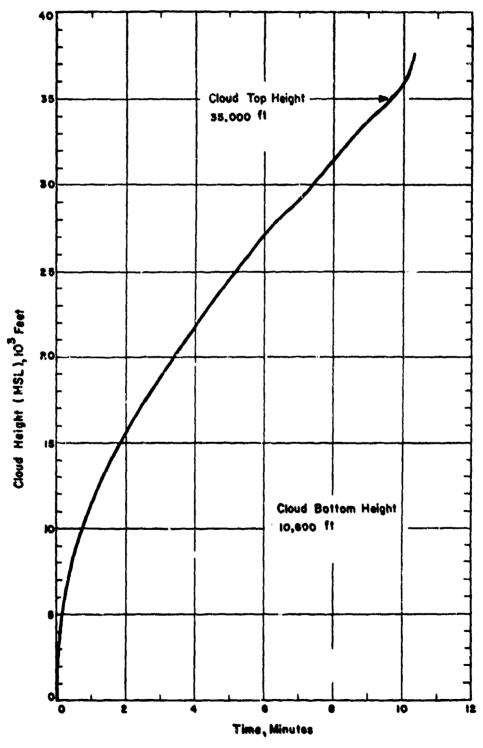


Figure 2. Cloud Dimensions: Operation TRINITY.

TABLE 1 ALAMOGORDO, NEW MEXICO WIND DATA FOR OPERATION TRINITY

Altitude	H-ho			urs		ours		ours	H+10+ 1	
<u>(MSL)</u>	Dir	Speed		Speed	Dir	Speed	Dir	Speed	Dir	Speed
feet	degrees	mph	degrees	mby	degrees	mph	degrees	mph	degrees	mbp
5,100	110	04								
5,300	160	07	330	OĦ.	160	03	240	C1	140	09
6,000	200	06	260	03	150	03	120	02	100	04
6,700	230	07	230	04	140	03	140	05	100	03
7,300	250	<b>08</b>	250	04	160	03	130	07	140	05
7,900	250	10	270	03	160	05	130	07	150	07
8,500	240	80	250	04	150	05	130	06	170	07
9,100	230	07	230	04	170	05	130	08	٦٥٠	07
9,700	220	08	230	07	190	07	140	10	TOO	06
10,300	220	12	230	10	210	10	150	10	170	05
10,900	220	11	230	13	200	11	150	80	180	04
11,500	200	80	220	12	180	11	150	05	070	02
12,100	190	07	170	10	170	11	190	03	310	05
12,700	170	09	160	11	180	11	240	03	310	06
13,300	170	15	160	12	190	11	240	04	320	Οħ
13,900	160	12	170	14	210	12	250	06	310	05
14,500	150	13	<b>c</b> 81	16	200	13	270	80	290	06
15,100	140	13	180	15	180	13	280	10	280	06
15,700	130	16	190	13	170	16	280	80	290	06
16,300	120	16	190	12	170	16	270	05	280	07
16,900	140	12	190	07	190	11	250	Ο¥	290	05
17,500	160	10	160	07	210	03	240	05	270	03
17,600	150	13								
18,100			170	05	320	02	260	05	270	03
18,600	150	12								
18,700			210	04	280	02	260	06	270	01
19,300			220	03	270	03	250	06	130	03
19,600	180	04								
19,900					270	02	250	06	180	05
20,600	250	04								••
21,600	240	80								
21,700							220	11	<b>210</b>	08
22,600	550	11					***			
22,900							190	17	<b>21</b> 0	16
23,600	220	15								
24,600	220	15			***					
29,600	230	16								
34,600	230	27								
39,600	240	19		~-						
44,500	290	18								
48,600	280	11								~-

Note: At H-hour the surface air pressure was 12.39 psi and the temperature 21.80g.

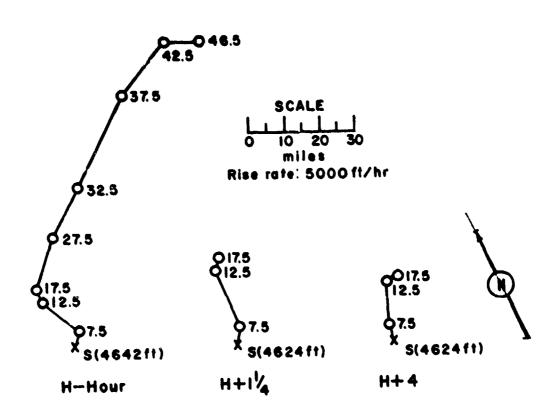


Figure 3. Hodographs for Operation TRINITY

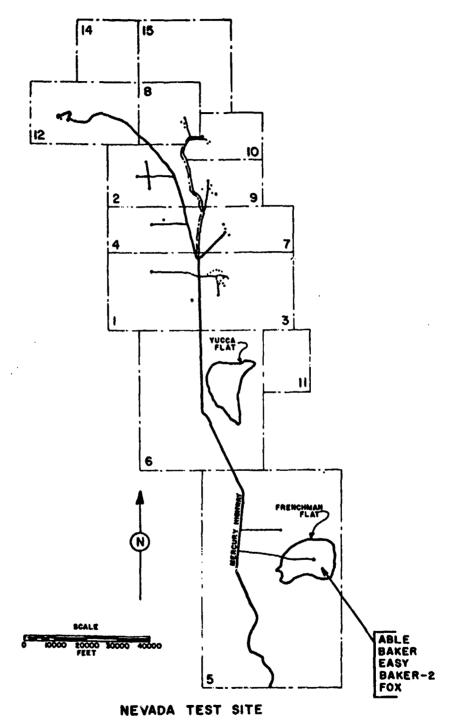


Figure 4. Operation RANGER, Shot Locations.

Able

PST GMT 27 Jan 1951 27 Jan 1951 0545

1345

NTS - Frenchman Flat 36° 48' N 115° 57' W

Sponsor: LASL

Site elevation: 3,140 ft

TOTAL YIELD: 1 kt

HEIGHT OF BURST: 1,060 ft

TYPE OF BURST AND PLACEMENT: Air burst

FIREBALL DATA:

Time to 1st minimum: 3.4 msec Time to 2nd maximum: MM

Radius at 2nd maximum:

CLOUD TOP HEIGHT: CLOUD BOTTOM HEIGHT:

17,000 ft MSL No available

#### REMARKS:

No local fallout. An induced-activity pattern was constructed from readings taken from  $H+l\frac{1}{4}$  hours and to  $H+l\frac{1}{2}$  hours along azimuths west and south of GZ. No decay correction was used. All the values below 20 mr/hr were measured with Geiger-Mueller type-2610A survey instruments. The values above 20 mr/hr were measured with highand low-range Juno ionization-type meters.

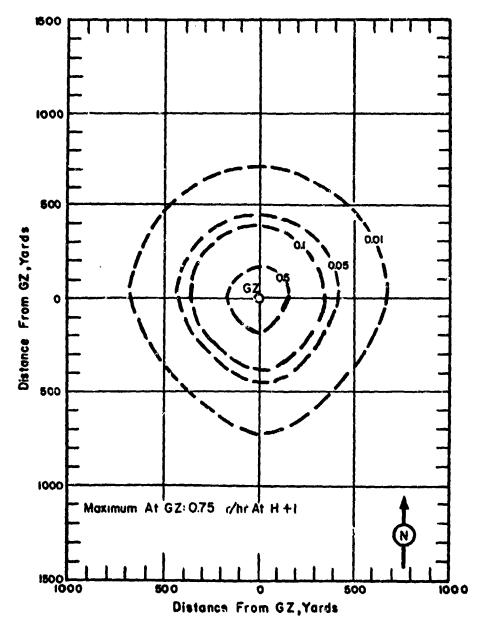


Figure 5. Operation RANGER - Able. On-site dose rate contours in r/hr at H+l hour.

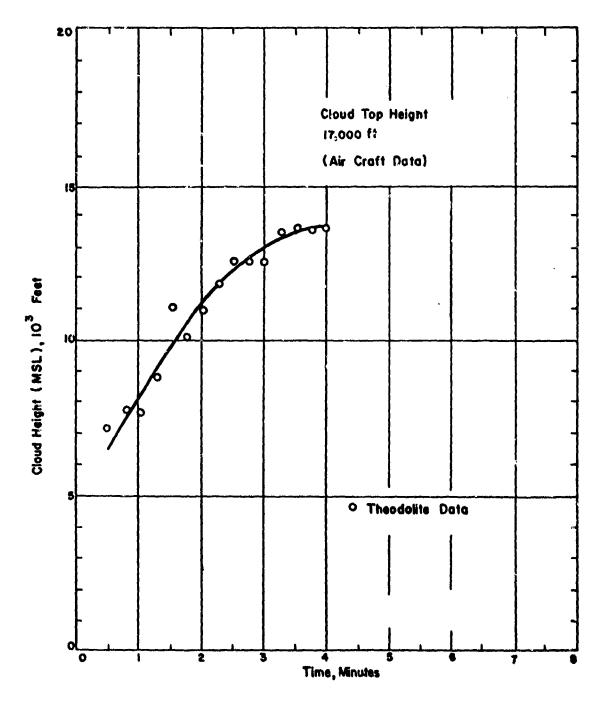


Figure 6. Cloud Dimensions: Operation RANGER -

Able

TABLE 2 NEVADA WIND DATA FOR OPERATION RANGER ...

		_
А	m	. 17

Altitude	titude H-la hours		H-ho	H-hour		H+lt hours	
(MSL)	Dir	Speed	Dir	Speed	Dir	Speed	
feet	degrees	mph	degrees	mph	degrees	mph	
Surface	130	03	130	02	Calm'	Calm	
4,000	140	03	140	02	Calm	Calm	
5,000	230	07	230	06	230	05	
6,000	510	21	190	73	180	07	
7,000	510	21	220	16	220	14	
8,000	240	14	270	13	290	13	
9,000	260	17	280	17	300	17	
10,000	260	20	280	21	300	21	
12,000	260	20	280	24	300	28	
14,000	*		270	21	270	21	
16,000	260	80	250	16	250	15	
18,000	-		270	35	270	35	
20,000			270	35	270	35	

NOTES:

- 1. Wind data was obtained from the Ranger control point located on the slope of a mountain approximately 10 miles (in a southwesterly direction) from Frenchman Lake.
- 2. Tropopause height was 33,000 ft MSL.
- 3. H-hour values were determined by interpolation between the H-1 $\frac{3}{4}$  and H+1 $\frac{1}{4}$  hour values.
- 4. The surface air pressure was 13.10 psi, the temperature -2.0°C and the relative humidity 73%.

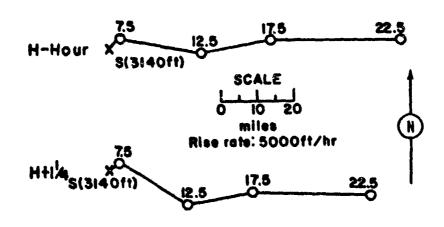


Figure 7. Hodographs for Operation Ranger -

Able.

Baker-1

Spensor: LASL

DATE: TIME: 0552

28 Jan 1951

28 Jan 1951 1352

SITE: NTS - Frenchman Flat

35° 48' N 115° 57' W

Site elevation: 3,140 ft

TOTAL YIELD: 8 kt

HEIGHT OF BURST: 1,080 ft

TYPE OF BURST AND PLACEMENT:

Air burst

FIREBALL DATA:

Time to 1st minimum:

6.8 msec

Time to 2nd maximum:

NM

Radius at 2nd maximum: NM

CLOUD TOP HEIGHT:

35,000 ft MSL

CLOUD BOTTOM HEIGHT:

Not available

CRATER DATA: No crater

# REMARKS:

No local fallout. An idealized induced-activity pattern was constructed from readings taken from  $H+l\frac{1}{4}$  hours and to  $H+l\frac{1}{2}$  hours along one azimuth west of GZ. No decay correction was used. All the values below 20 mr/hr were measured with Geiger-Mueller type 2610A survey instruments. The values above 20 mr/hr were measured with high- and low-range Juno ionization-type meters.

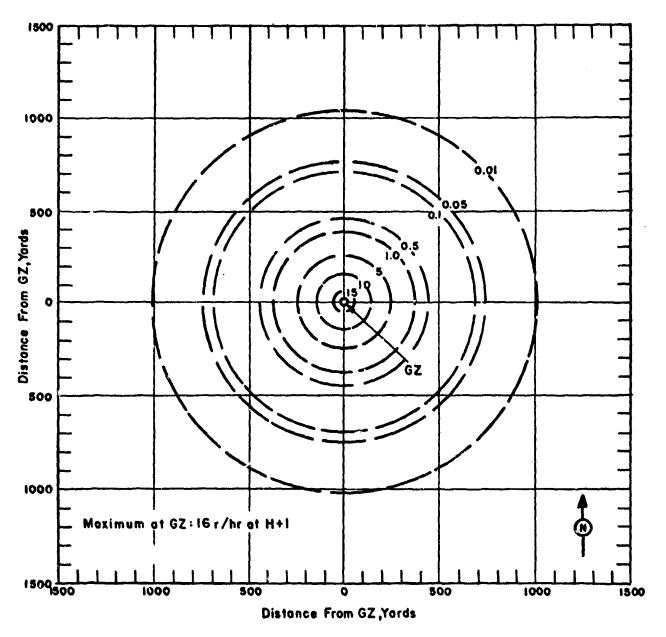


Figure 8. Operation RANGER - Baker. On-site dose rate contours in r/hr at H+1 hour.

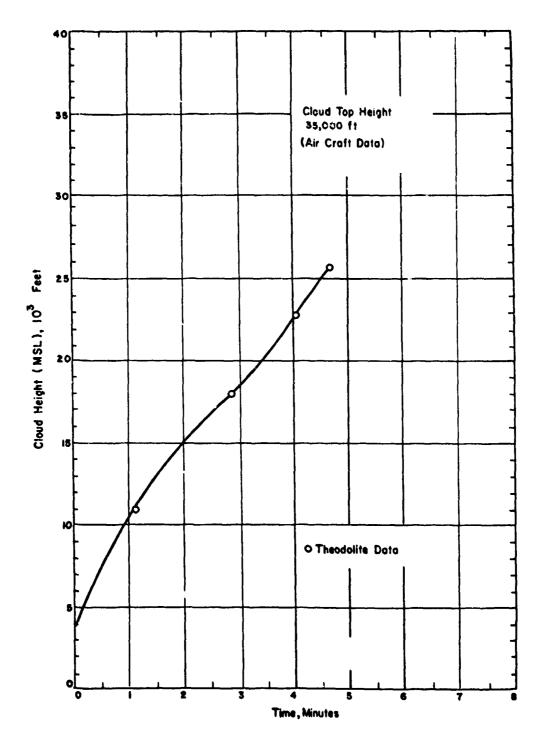


Figure 9. Cloud Dimensions: Operation RANGER -

Baker 1.

Altitude	ie H-1 hours		H-hou	H-hour		ours
(MSL)	Dir	Speed	Dir	Speed	Dir	Speed
feet	degrees	mph	degrees	mph	degrees	amph
Surface	200	03	190	07	180	09
4,000	500	05	190	07	190	09
5,000	540	13	240	12	240	12
6,000	230	18	240	15	£40	14
7,000	240	15	250	10	250	07
8,000	260	12	270	09	270	80
10,000	260	13	280	15	300	18
12,000	250	15	270	18	290	21
15,000			(310)	(23)	(310)	(23)
16,000			310	24	310	24
18,000			310	31	310	31
20,000			300	26	300	26
25,000			290	41	290	41
30,000			290	38	290	38

## NOTES:

- 1. Numbers in parenthesis are estimated values.
- 2. Wind data was obtained from the Ranger control point located on the slope of a mountain approximately 10 miles (in a southwesterly direction) from Frenchman Lake.
- Tropopause height was 32,000 ft MSL.
  H-hour values were determined by interpolating between the H-14 and H+14 hour values.
- The surface air pressure was 13.04 psi, the temperature -2.8°C, and the relative humidity 87%.

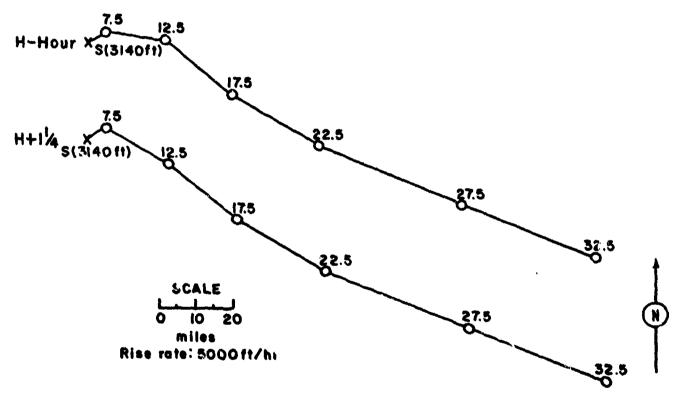


Figure 10. Hodographs for Operation RANGER -

Easy

PST GMT

DATE: 1 Feb 1951 1 Feb 1951

TIME: 0547 1347

Sponsor: LASL

SITE: NTS - Frenchman Flat 36° 48' N 115° 57' W

Site elevation: 3,140 ft

TOTAL YIELD: 1 kt

HEIGHT OF BURST: 1,080 ft

TYPE OF BURST AND PLACEMENT: Air burst

FIREBALL DATA:

Time to 1st minimum: 5.0 msec Time to 2nd maximum: NM Radius at 2nd maximum: NM CLOUD TOP HEIGHT: 12,500 ft MSL CLOUD BOTTOM HEIGHT: Not available

CRATER DATA: No crater

# REMARKS:

No local fallout. Induced activity pattern was constructed from readings taken from H+l hour and to  $H+l\frac{1}{2}$  hours along four azimuths: north, east, south, and west. No decay correction was used. All the values below 20 mr/hr were measured with Geiger-Mueller type 2610A survey instruments. The values above 20 mr/hr were measured with high- and low-range Juno ionization-type meters.

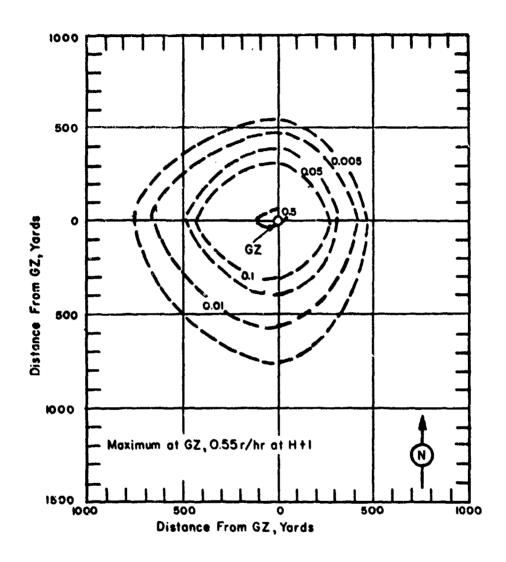
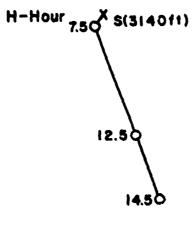


Figure 11. Operation RANGER - Easy. On-site dose rate contours in r/hr at H+1 hour.

Altitude	H-14 h	ours	H-ho	ur	H+1+ h	ours
(MSL)	Dir	Speed	Dir	Speed	Di r	Speed
feet	degrees	mph	degrees	mph	degrees	mph
Surface	020	03	010	02	Calm	Ca lm
4,000	020	05	010	02	Calm	Calm
5,000	020	17	030	11	040	06
6,000	100	09	060	10	010	10
7,000	050	16	360	18	370	21
8,000	360	23	340	29	330	32
9,000	340	31	340	26	340	24
10,000	340	26	340	30	340	32
12,000	330	26	340	45	340	62

#### NOTES:

- 1. H-hour values were determined by interpolating between the H-l $\frac{3}{4}$  and H+l $\frac{1}{4}$  hour values.
- 2. Wind data was obtained from the Ranger control point located on the slope of a mountain approximately 10 miles (in a southwesterly direction) from Frenchman Lake.
- Tropopause height was 35,000 ft MSL.
  The surface air pressure was 13.33 psi, the temperature -11.5°C and the relative humidity 89%.



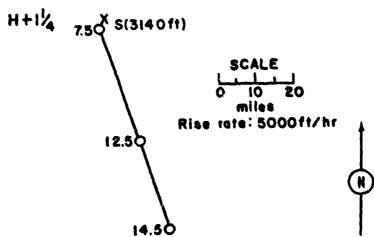


Figure 12. Hodographs for Operation RANGER -

Easy.

Baker 2

PST GMT

DATE: 2 Feb 1951 2 Feb 1951 TIME: 0549 1349

SITE: NTS - Frenchman Flat

36° 48' N 115° 57' W

Site elevation: 3,140 ft

TOTAL YIELD: 8 kt

HEIGHT OF BURST: 1,100 ft

TYPE OF BURST AND PLACEMENT:

Air burst

Sponsor: LASL

FIREBALL DATA:

Time to 1st minimum: 8.9 to 9.2 msec

Time to 2nd maximum: NM Radius at 2nd maximum: NM

CLOUD TOP HEIGHT: 28,000 ft MSL CLOUD BOTTOM HEIGHT: Not available

CRATER DATA: No crater

#### REMARKS:

No local fallout. Induced-activity pattern was constructed from 8 surveys made from H+l and to H+28 hours along stakes placed 100 yd apart on four azimuths, north, east, south, and west. Decay corrections were made from measurements along the west azimuth. All the values below 20 mr/hr were measured with Geiger-Mueller type 2610A survey instruments. The values above 20 mr/hr were measured with high- and low-range Juno ionization-type meters.

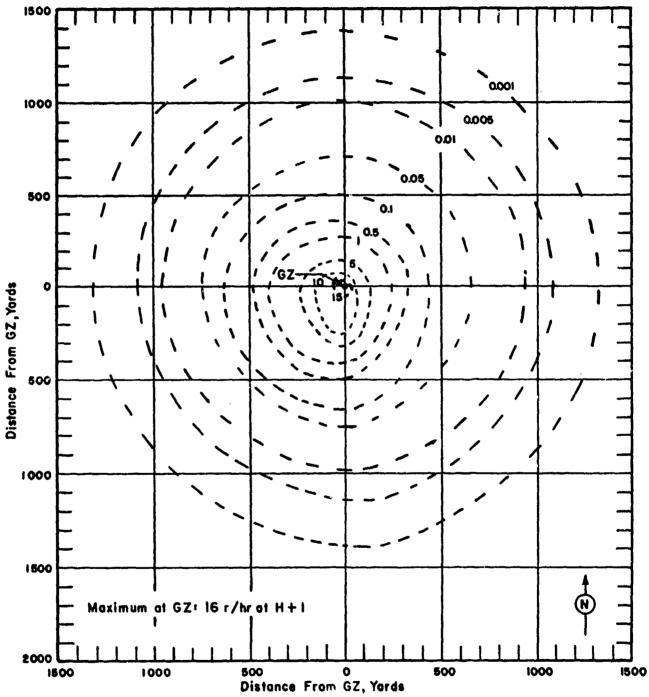


Figure 13. Operation RANGER - Baker 2. On-site dose rate contours in r/hr at H+1 hour.

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Altitude	H-12 h	ours	H-ho	ur	H+1# he	ours
(MSL)	Dir	Speed	Dir	Speed	Dir	Speed
feet	degrees	mph	degrees	mph	degrees	mph
Surface	Ca lm	Calm	Calm	Calm	Calm	Calm
4,000	Calm	Calm	Calm	Calm	Calm	Calm
5,000	180	02	190	02	190	02
6,000	240	01	230	05	220	07
7,000	190	10	210	15	220	17
8,000	190	22	210	26	220	30
9,000	240	26	250	26	260	26
10,000	260	24	260	25	270	28
12,000	280	29	290	33	290	36
14,000	290	22	290	35	290	43
15,000			(290)	(45)	(290)	(45)
16,000			290	47	290	47
18,000			280	43	280	43
20,000			290	51	290	51

#### NOTES:

- 1. Numbers in parentheses are estimated values.
- 2. Wind data was obtained from the Ranger control point located on the slope of a mountain approximately 10 miles (in a southwesterly direction) from Frenchman Lake
- 3. H-hour values were determined by interpolating between the H-1 $\frac{3}{4}$  and H+1 $\frac{1}{4}$  hour values.
- 4. Tropopause height was 38,000 ft MSL.
- 5. The surface air pressure was 12.81 psi, the temperature -9.2°C and the relative humidity 79%.

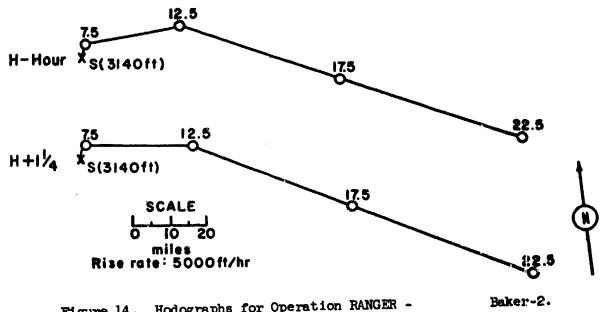


Figure 14. Hodographs for Operation RANGER -

Fox

PST 6 Feb 1951 6 Feb 1951

TIME: 0547 1347

MIS - Frenchman Flat 36° 48' N

115° 57' W

Sponsor: LASL

Site elevation: 3,140 ft

YOTAL YIELD: 22 kt

HEIGHT OF BURST. 1,435 ft

TYPE OF BURST AND PLACEMENT: Air burst

FIREBALL DATA:

Time to 1st minimum: 7.6 to 15.4 msec

Time to 2nd maximum: NM Radius at 2nd maximum: MM

CLOUD TOP HEIGHT: 43,000 ft MSL CLOUD BOTTOM HEIGHT: 27,000 ft MSL

No Crater CRATER DATA:

#### REMARKS:

No local fallout. Induced-activity pattern was constructed from readings taken from  $H_4^3$  hours and to  $H_7^1$  hours along azimuth. No decay correction was used. All the values below 20 mr/hr were measured with Geiger-Mueller type-2610A survey instruments. The values above 20 mr/hr were measured with high- and low-range June ionization-type meters.

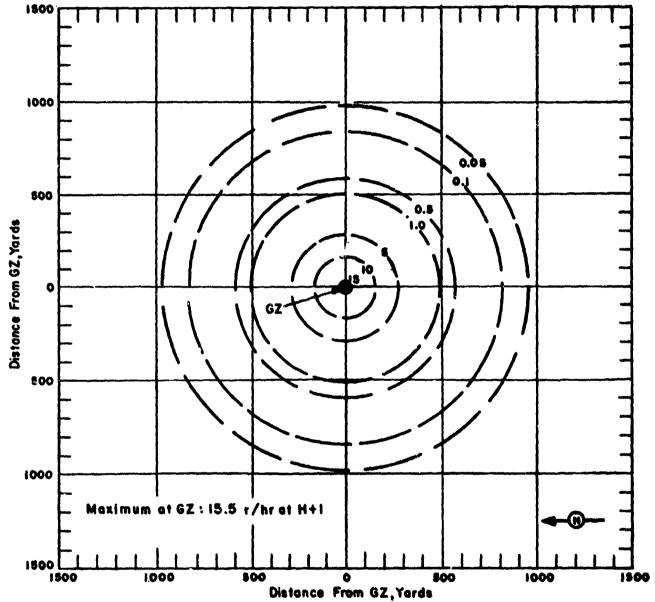


Figure 15. Operation RANGER - Fox. On-site dose rate contours in r/hr at H+1 hour.

Altitude	H-15 h	aruo
(MSL)	Dir	Speed
feet	degrees	mph
Surface	150	02
4,000	140	02
5,000	050	08
6,000	350	10
7,000	310	09
3,000	270	12
9,000	290	21
10,000	310	31
12,000	330	
14,000	340	51 49
15,000	(340)	(53)
16,000	330	56
18,000	330	45
20,000	310	56
25,000	300	58
30,000	290	52

## NOTES:

- 1. Numbers in parentheses are estimated values.
- 2. Wind data was obtained from the Ranger control point located on the slope of a mountain approximately 10 miles (in a southwesterly direction) from Frenchman Lake.
- 3. Tropopause height was 40,000 ft MSL.
- 4. The surface air pressure was 13.18 psi, the temperature -2.0°C and the relative humidity 85%.

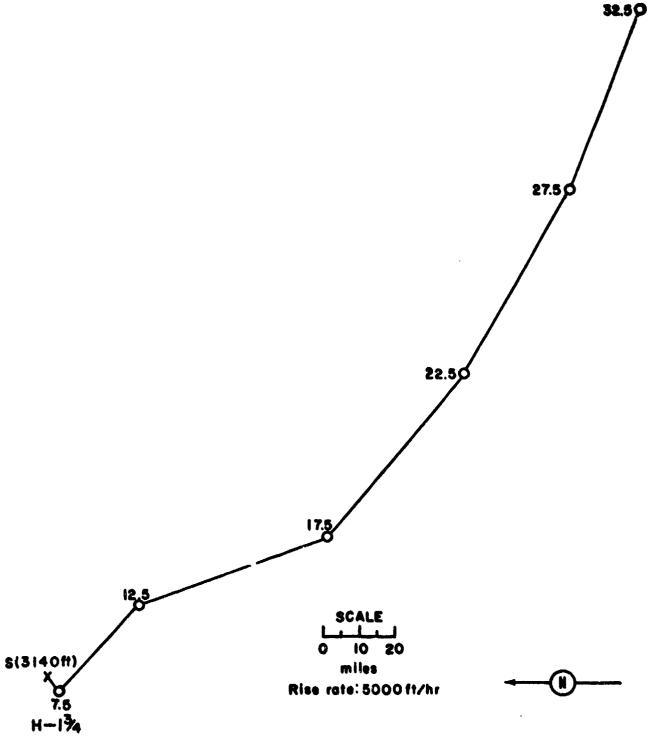
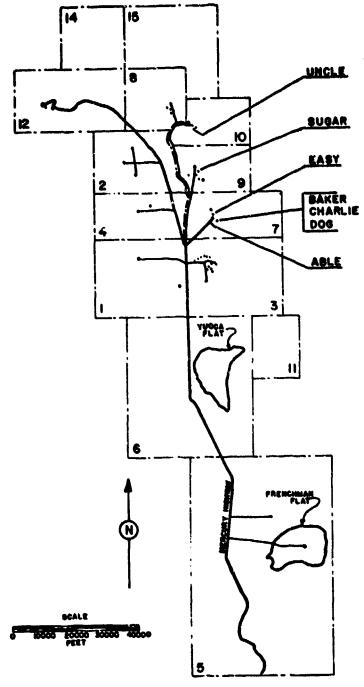


Figure 16. Hodograph for Operation RANGER -

lox.



NEVADA TEST SITE

Figure 17. Operation BUSTER-JANGLE, Shot Locations.

OPERATION BUSTER - JANGLE -

Able

PST GMT

22 Oct 1951 22 Oct 1951

TIME: 0600 1400

Sponsor: LASI

TOTAL YIELD: <0.1 kt

SITE: NTS - Area 7 - Station 5 37° 05' 02" N

116° 01' 26" W Site elevation: 4,169.17 ft

FIREBALL DATA:

Time to 1st minimum: NM
Time to 2nd maximum: NM
Radius at 2nd maximum: NM

HEIGHT OF BURST: 100 ft

TYPE OF BURST AND PLACEMENT:
Tower burst over Nevada soil

CRATER DATA: No crater

CLOUD TOP HEIGHT: 8,000 ft MSL CLOUD BOTTOM HEIGHT: 6,700 ft MSL

#### REMARKS:

Gamma contamination was insignificant. The alpha contamination shown is based upon readings taken on D day and D+1 and is reported in counts per minute with 50% geometry. Missiles were scattered over a 500-yard radius. Readings on some pieces were greater than 20,000 counts per minute.

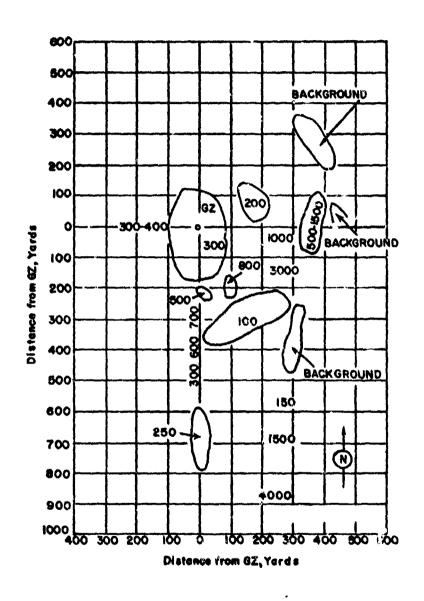


Figure 18. Operation BUSTER-JANGLE - Able.
Alpha contamination designated in counts per minute with 50% geometry.

Altitude	H-ho	ur	H+1 h	our	H+7 hc	urs
(MSL)	Dir	Speed	Dir	Speed	Dir	Speed
feet	degrees	mby	degrees	mbµ	degrees	mph
Surface	320	06	320	09	270	07
5,000	320	10	320	10	320	07
6,000	310	17	310	17	320	05
7,000	310	20	310	20	330	03
8,000	310	20	310	50	330	<b>0</b> 6
9,000	310	21	310	51	320	07
10,000	300	20	300	20	300	07
12,000	320	29	320	29	320	22
14,000	320	39	320	39	320	33
15,000			320	41	310	38
16,000	320	54	320	54	310	43
18,000	320	55	320	55	310	39
20,000	320	47	320	47	320	57
23,000			320	55	***	
25,000	320	61			320	87

# ' NOTE:

Wind data was obtained by the Mercury Weather Station located at the C. P. At H-hour the pressure at ground zero was 874 mb, the temperature 5.8°C and the relative humidity 22 percent.

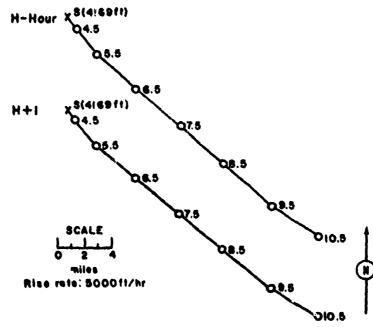


Figure 19. Hodographs for Operation BUSTER-JANGLE-

Able.

#### Baker

PST GCT

DATE: 28 Oct 1951 28 Oct 1951

TIME: 0720 1520

SITE: NTS - Area 7 - Station 3 37° 05' 06" N

116° 01' 12" W Site elevation: 4,193 ft

TOTAL YIELD: 3.5 kt

EXIGHT OF BURST: 1,118 ft

Sponsor: LASL

CLOUD TOP HEIGHT: 31,700 rt MSL CLOUD BOTTOM HEIGHT: 23,000 rt MSL

FIREBALL DATA:

Time to 1st minimum: 5.5 to 6.0 msec

Time to 2nd maximum: NM Radius at 2nd maximum: NM

CHATER DATA: No crater

TIPE OF BURST AND PLACEMENT:
Air burst over Nevaia soil

## REMARKS:

The contours resulting from this shot were due primarily to neutron-induced activity. Readings were obtained by monitors during area surveys or recovery operations and were taken 3 ft above ground with T1B or SU-10 ionizati pechamber survey meters. The pattern was obtained from readings taken at #H+11 hours and corrected to H+1 hour, using the decay curve for neutron-induced activity in Nevada soil

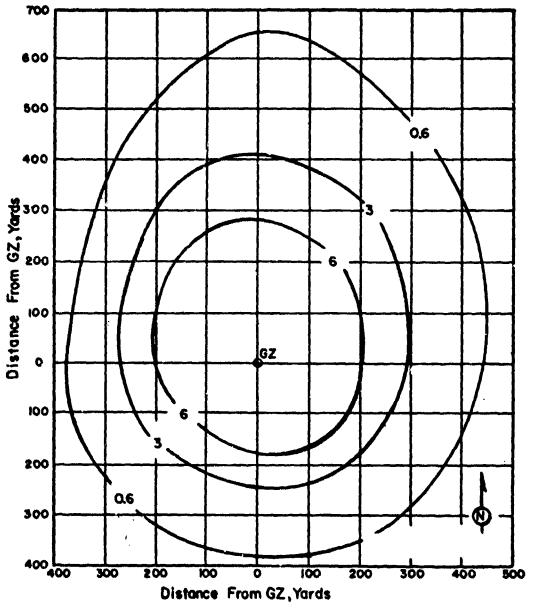


Figure 20. Operation BUSTER-JANGLE - Baker.
On-site dose rate contours in r/hr at H+1 hour.

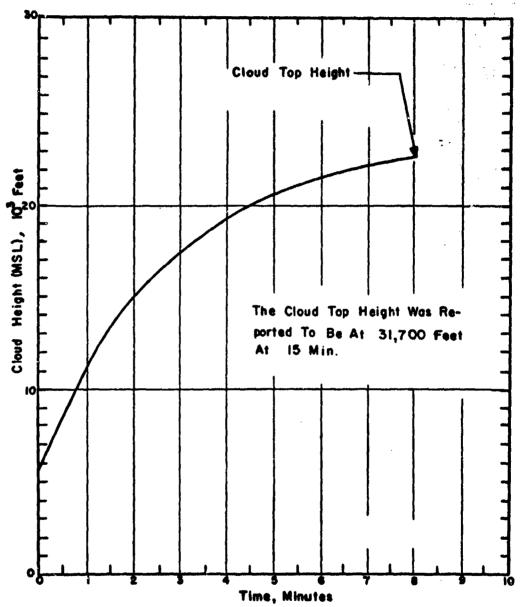


Figure 21. Cloud Dimensions: Operation BUSTER-JANGLE -

Baker.

NEVADA WIND DATA FOR OPERATION BUSTER-JANGLE

Altitude	H-h	our	H+25 h	ours
(MSL)	Dir	Speed	Dir	Speed
feet	degrees	mph	degrees	mph
Surface	320	10	340	07
5,000			050	14
6,000	030	23	OHO	18
7,000			040	23
8,000	050	29	040	25
9,000			040	25
10,000	070	17	030	20
12,000	100	14	050	05
14,000	050	17	080	13
15,000	(050)	(20)	(080)	(13)
16,000	050	21	070	14
18,000	050	25	060	18
20,000	050	26	<b>0</b> 50	26
23,000	050	32		
25,000	050	44	050	24
30,000	060	50	050	22
35,000	060	63	·	

- 1. Numbers in parentheses are estimated values.
- 2. Wind data was obtained by the Mercury Weather Station at the C. P.
- 3. Tropopause height was 39,000 ft MSL.
  4. At H-hour the pressure at ground zero was 877 mb, the temperature 11.4°C and the relative humidity 28 percent.

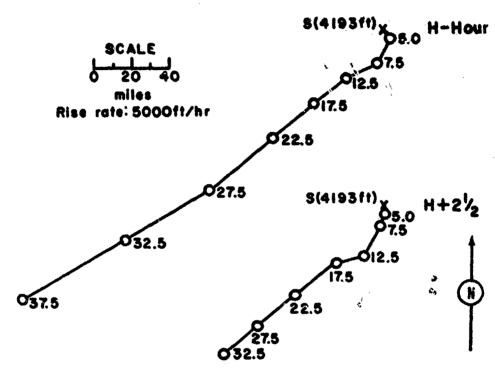


Figure 22. Hodographs for Operation BUSTER-JANGLE -

Baker

Charlie

DATE: 30 Oct 1951 30 Oct 1951 TIME: 0700 1500

SITE: NTS - Areas 7 -

Sponsor: IASL

Station 3 37° 05' 06" N 116° 01' 13" W

TOTAL YIELD: 14 kt

Site elevation: 4,193 ft

HEIGHT OF BURST: 1,132 ft

TYPE OF BURST AND PLACEMENT: Air burst over Nevada soil

FIREBALL DATA:

Time to 1st minimum: 12.5 to 13.0 msec Time to 2nd maximum: 130 to 135 msec

Radius at 2nd maximum: NM

CRATER DATA: No crater

IL TOP HEIGHT: 41,000 ft MSL CLOUD BOTTOM HEIGHT: 27,000 ft MSL

# REMARKS:

The contours resulting from this shot were due primarily to neutroninduced activity. Readings were obtained by monitors during area surveys or recovery operations and were taken 3 ft above ground with TlB or SU-10 ionization-chamber survey meters. The pattern was obtained from readings taken at H+9 hours and corrected to H+1 hour using the decay curve for neutron-induced activity in Nevada soil,

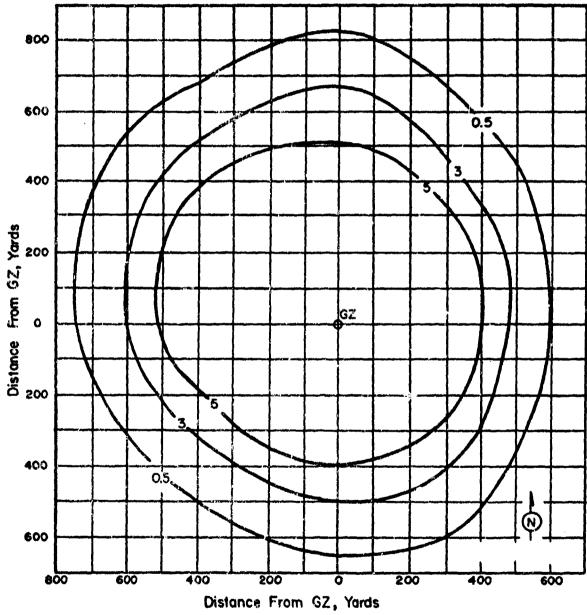


Figure 23. Operation BUSTER-JANGLE - Charlie.
On-site dose rate contours in r/hr at H+l hour.

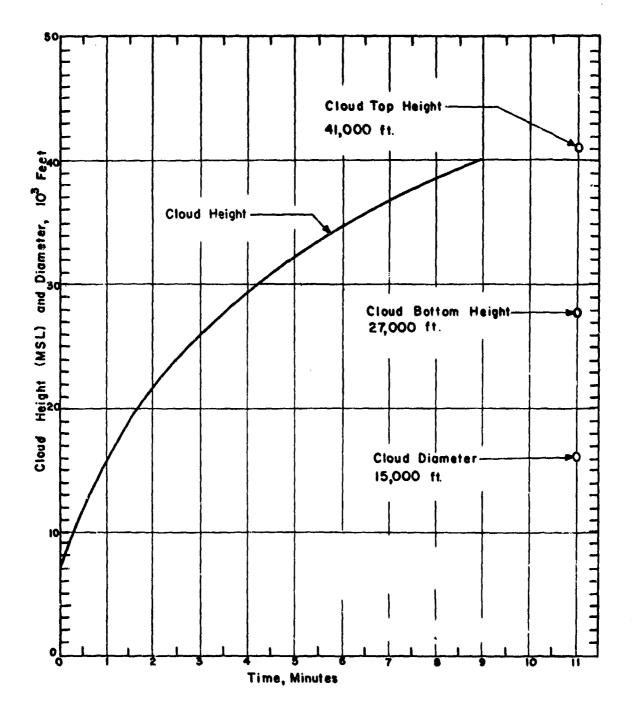


Figure 24. Cloud Dimensions: Operation BUSTER-JANGLE -

Charlie.

TABLE 9 NEVADA WIND DATA FOR OPERATION BUSTER-JANGLE -

CHARLIE

Altitude	H-ho	ur	H+1 h	our	H+3 ho	ours	H+6 h	ours
(MSL)	Dir	Speed	Dir	Speed	Dir	Speed	Dir	Speed
feet	degrees	तवृत्त	degrees	mph	degrees	mph	degrees	mph
Surface	360	06	<b>36</b> 0	06	310	05	090	06
5,000			340	07	Calm	Calm	040	03
6,000	290	05	290	05	Calm	Calm	02C	05
7,000			290	06	Calm	Calm	350	05
8,000	290	12	290	12	260	02	300	08
9,000			270	13	270	02	280	08
10,000	230	06	230	06	250	05	290	05
12,000	130	07	130	07	180	06	090	03
14,000	080	09	080	09	100	05	070	08
15,000	(080)	(10)	070	07	090	09	040	10
16,000	080	12	<b>08</b> 0	12	070	13	050	15
18,000	090	20	090	20	050	20	060	13
20,000	070	24	070	24	050	16	090	10
23,000	060	29						
25,000	050	32	050	32	060	25	040	18
30,000	050	35			050	38	030	28
35,000	060	29			060	31	030	20
40,000	230	40					220	12
45,000							220	05
50,000							290	17

- 1. Numbers in parentheses are estimated values.
- 2. Wind data was obtained by the Mercury Weather Station located at the C. P.
- 3. Tropopause height was 38,000 ft MSL.4. At H-hour the pressure at ground zero was 872 mb, the temperature 5.3°C and the relative humidity 14 percent.

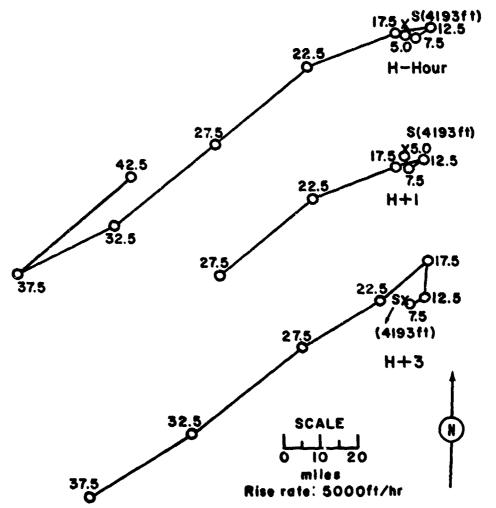


Figure 25 Hodographs for Operation BUSTER-JANGLE -

Charlie.

Dog

PST GCT DATE: 1 Nov 1951 1 Nov 1951

TIME: 0730 1530 Sponsor: LASL

SITE: NTS - Area 7 -Station 3

37° 05' 05" N 116° 01" 11" W

Site elevation: 4,193 ft

HEIGHT OF BURST: 1,417 ft

FIREBALL DATA:

TOTAL YIELD: 21 kt

TYPE OF BURST AND PLACEMENT: Air burst over Nevada soil

Time to 1st minimum: Time to 2nd maximum: 15.6 msec

160 to 175 msec

Radius at 2nd maximum:

CRATER DATA: No crater

CLOUD TOP HEIGHT: 46,000 ft MSL CLOUD BOTTOM HEIGHT: 31,000 ft MSL

#### REMARKS:

The contours resulting from this shot were due primarily to neutroninduced activity. Readings were obtained by monitors during area surveys or recovery operations and were taken 3 ft above ground with T1B or SU-10 ionization-chamber survey meters. The pattern was obtained from readings taken at H+251 hours and corrected to H+1 hour using the decay curve for neutron-induced activity in Nevada soil

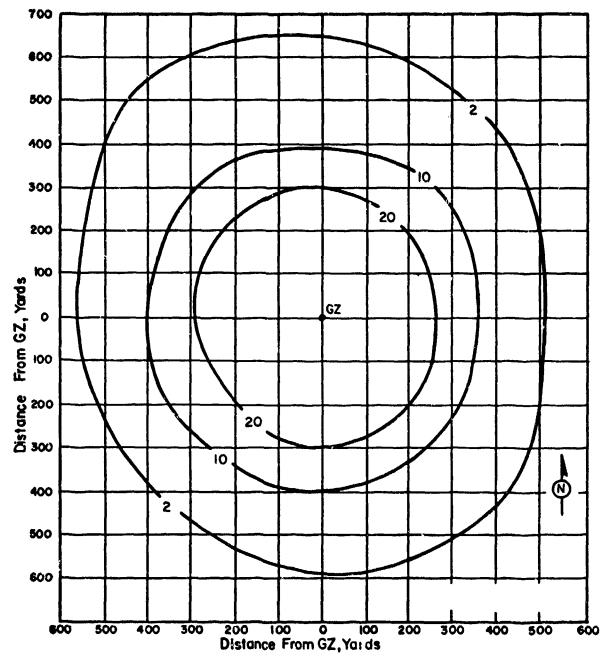


Figure 26. Operation EUSTER-JANGLE - Dog. On-site dose rate contours in r/hr at H+l hour.

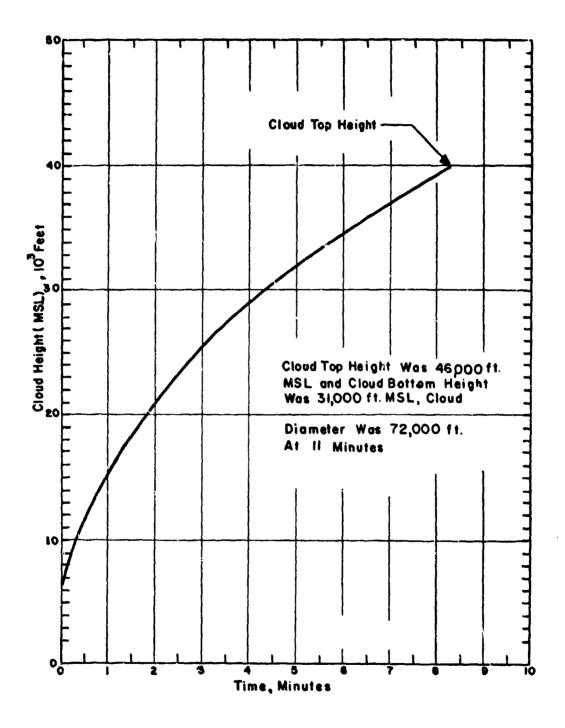


Figure 27. Cloud Dimensions: Operation BUSTER-JANGLE -

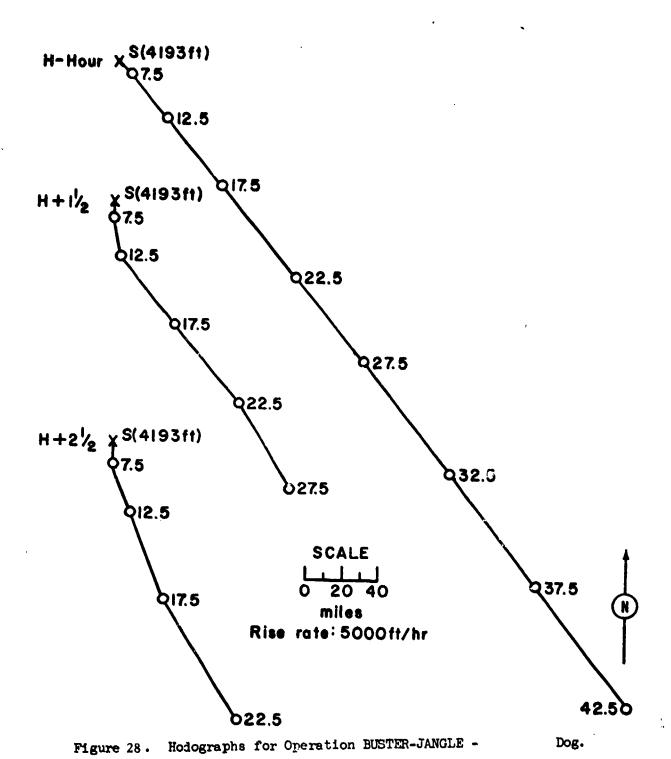
Dog.

TABLE 10 NEVADA WIND DATA FOR OPERATION BUSTER-JANGLE -

DOG

Altitude	H-hor	ur	H+13 1	hours	H+25 hours		H+5支	hours
(MSL)	Dir	Speed	Dir	Speed	Dir	Speed	Dir	'Speed
feet	degrees	mph	degrees	mph	degrees	mph	degree	s mph
Surface	340	cs	040	07	350	17	360	08
5,000			360	07	360	17	050	80
6,000	320	14	330	10	350	15	030	. 10
7,000			340	17	330	10	010	15
8,000	320	35	350	5/1	330	13	350	13
9,000			350	20	310	18	320	12
10,000	320	37	350	18	340	26	320	16
12,000	320	38	320	31	340	48	340	35
14,000	320	41	330	40	340	52	340	47
15,000	(320)	(45)	(320)	(45)	(340)	(50)	340	47
16,000	320	48	320	49	340	49	330	38
18,000	320	60	320	53	330	63	330	63
20,000	320	63	320	54	330	76	330	66
23,000	320	58						
25,000	320	58	330	52				
30,000	320	73				~		
35,000	320	76						
40,000	320	80						

- 1. Numbers in parentheses are estimated values.
- 2. Wind data was obtained by the Mercury Weather Station located at
- Tropopause height was 38,000 ft MSL.
- Tropopause height was 38,000 ft MSL.
  At H-hour the pressure at ground zero was 876 mb, the temperature 15.5°C and the relative humidity 43 percent.



Easy

PST GCT.

DATE: 5 Nov 1951 5 Nov 1951

FIME: 0830 1630

Sponsor: LASL

SITE: NTS - Area 7 - Station 1

37° 05' 31" N 116° 01' 28" W

Site elevation: 4,224 ft HEIGHT OF BURST: 1,314 ft

TOTAL YIELD: 31.0 kt

TYPE OF BURST AND PLACEMENT:
Air burst over Nevada soil

FIREBALL DATA:

Time to 1st minimum: 15 to 20 msec

Time to 2nd maximum: 190 to 210 msec Radius at 2nd maximum: NM

CLOUD TOP HEIGHT: 50,000 ft MSL CLOUD BOTTOM HEIGHT: 35,000 rt MSL

CRATER DATA: No crater

#### REMARKS:

The contours resulting from this shot were due primarily to neutron-induced activity. Readings were obtained by monitors during area surveys or recovery operations and were taken 3 ft above ground with TlB or SU-10 ionization chamber survey meters. The pattern was obtained from readings taken at H+24 hours and corrected to H+1 hour, using the decay curve for neutron-induced activity in Nevada soil

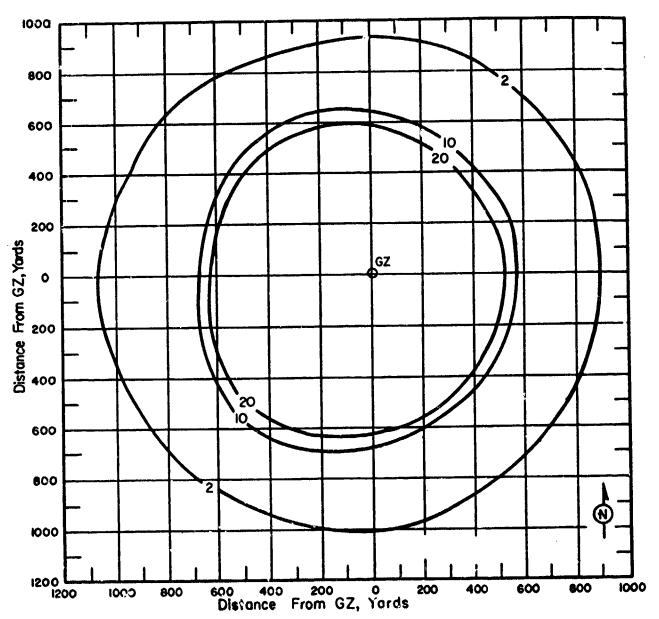


Figure 29. Operation BUSTER-JANGLE - Easy.
On-site done rate contours in r/hr at H+l hour.

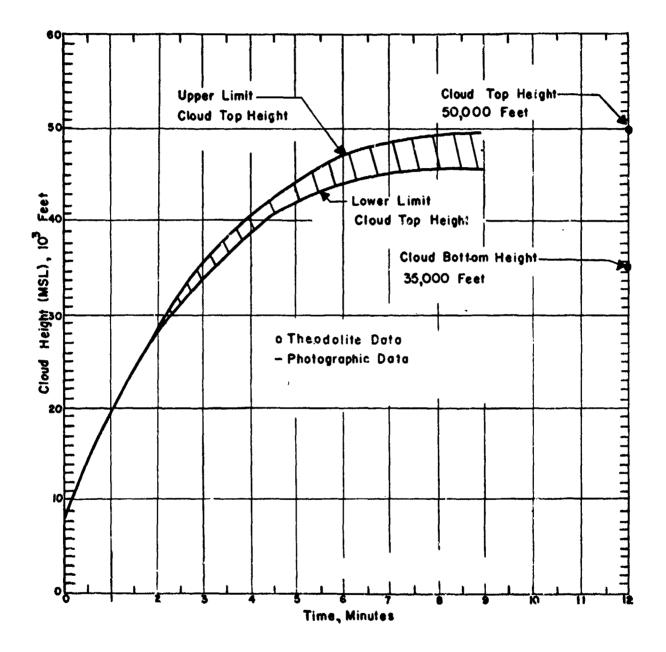


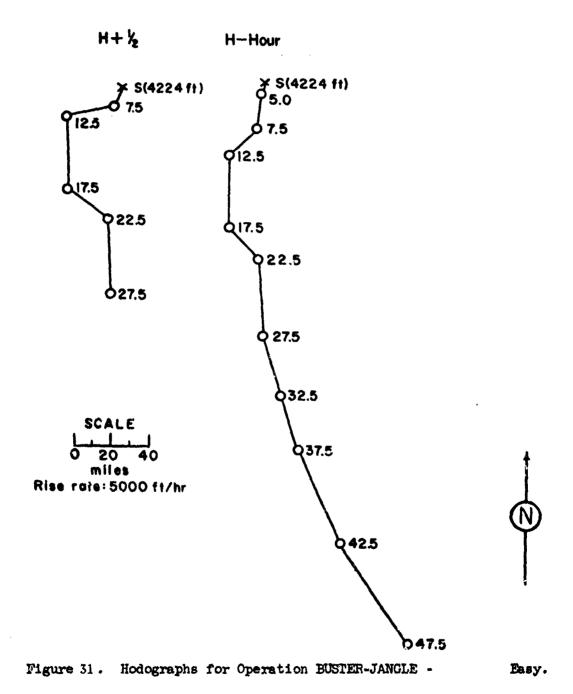
Figure 30. Cloud Dimensions: Operation BUSTER-JANGLE - Easy.

TABLE 11 NEVADA WIND DATA FOR OPERATION BUSTER-JANGLE -

EASY

Altitude	H-ho	ur	H+3 h	our
(MSL)	Dir	Speed	Dir	Speed
feet	degrees	mph	degrees	mph
Surface	020	15	020	10
5,000	** **		020	16
6,000	010	29	010	18
7,000			360	18
8,000	020	18	020	16
9,000	***		040	18
10,000	050	21	070	22
12,000	040	25	040	25
14,000	010	38		
15,000	(360)	(37)	360	36
16,000	340	37	340	35
18,000	350	26	340	28
20,000	320	22	310	26
25,000	360	38	360	38
28,000	350	32	40 40	-
30,000	350	31		~-
35,000	350	40	m # 14	~-
40,000	340	52		
45,000	330	63	~~~	

- 1. Numbers in parentheses are estimated values.
- 2. Wind data was obtained by the Mercury Weather Station located at the C. P.
- Tropopause height was 35,000 ft MSL.
  At H-hour the pressure at ground zero was 878 mb, the temperature 11.3°C and the relative humidity 17%.



Sugar

PST GMT

DATE: 19 Nov 1951 19 Nov 1951

TIME: 0900 1700

Sponsor: DOD

TOTAL YIELD: 1.2 kt

FIREBALL DATA:

ITE: NTS - Area 9 37° 07' 54" N 116° 02' 19" W Site elevation: 4,215 ft

HEIGHT OF BURST: 3.5 ft

TYPE OF BURST AND PLACEMENT:
Surface burst from platform
msec on Nevada soil

Time to 1st minimum: 6 - 7 msec Time to 2nd maximum: NM Radius at 2nd maximum: NM

CLOUD TOP HEIGHT: 15,000 ft MSL CLOUD BOTTOM HEIGHT: 11,000 ft MSL

CRATER DATA: Diameter: 90 ft maximum dose rate: 7500 r/hr at H+1

Depth: 21 ft at crater lip hour

Volume: 50,000 ft<sup>3</sup>

## REMARKS:

The contamination resulting from this shot was well documented to several thousand yards. The on-site pattern was drawn from the data and maps of three scientific projects and can be considered reliable. Direct measurements of radiation fields at one hour after burst were obtained with constant-recording scintillation counters. Additional readings were taken with AN/PDR-TIB survey meters over the period 24 to 70 hours after burst. These readings were corrected to the reference time of one hour by the use of the t<sup>-1.2</sup> decay approximation. The off-site pattern is less reliable because only a limited number of readings were available.

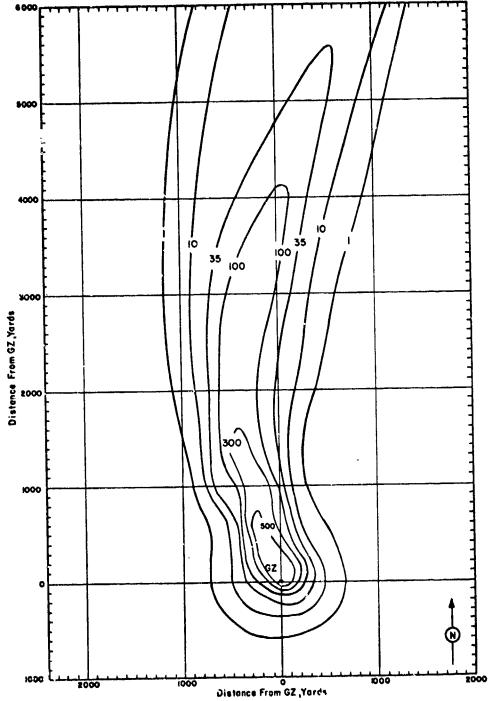


Figure 32. Operation BUSTER-JANGLE - Sugar.
On-site dose rate contours in r/hr at H+l hour.

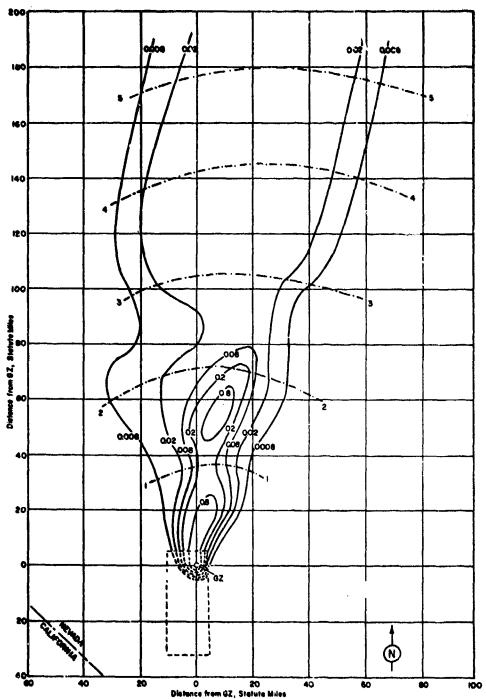


Figure 33. Operation EUSTER-JANGLE - Sugar.
Off-site dose rate contours in r/hr at H+l hour.

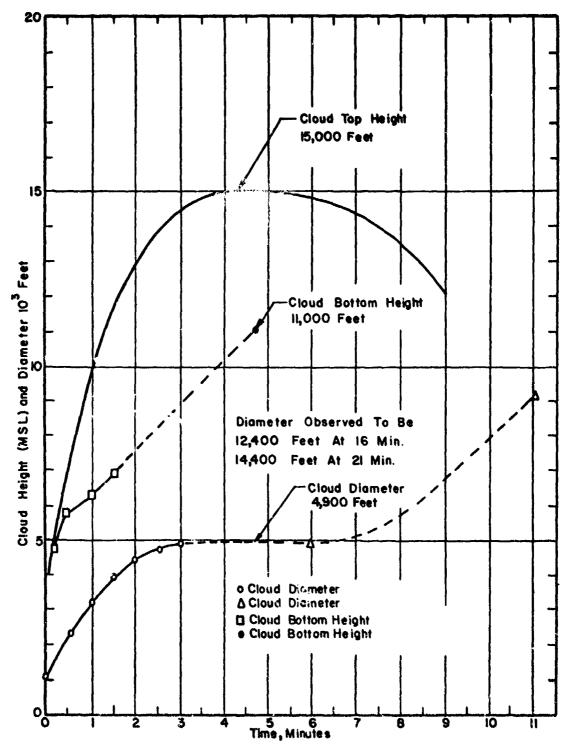


Figure 34. Cloud Dimensions: Operation BUSTER-JANGLE -

Sugar.

Altitude	H-hor	ır	H+l ho	ur	H+4 h	ours
(MSL)	Dir	Speed	Dir	Speed	Dir	Speed
feet	degrees	шЪу	degrees	mph	degrees	mph
Surface	190	02	Calm	Calm	180	09
5,000			Calm	Ca lm	170	12
6,000	170	15	170	15	170	18
7,000			180	23	180	26
8,000	180	30	180	30	180	31
9,000			200	32	180	35
10,000	200	37	200	37	190	42
12,000	200	42	200	42	210	51
14,000	210	46	510	46	510	44
15,000			210	47	210	45
16,000	210	51	210	51	500	66
18,000	200	72	200	72	500	55
20,000	200	62	200	62	190	69
25,000	210	71				
30,000	510	80				
35,000	210	90				

- 1. Wind data was obtained by the Mercury Weather Station located at the C. P.
- 2. At H-hour the pressure of ground zero was 871.5 mb, the temperature 1°C and the relative humidity 47%.

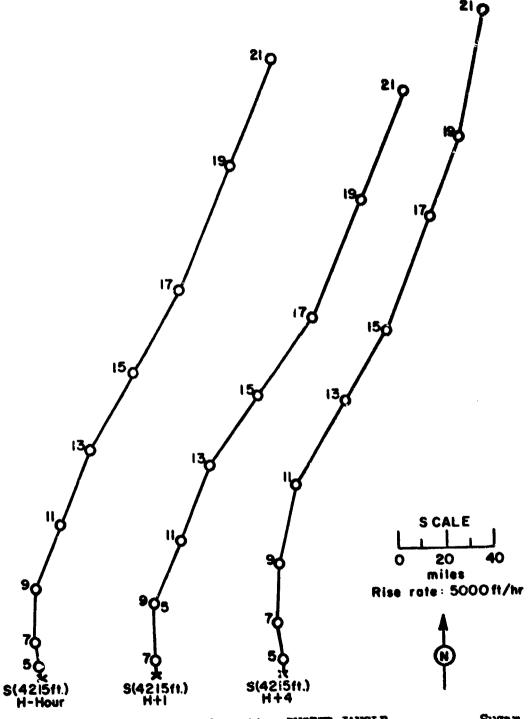


Figure 35. Hodographs for Operation BUSTER-JANGLE -

Sugar.

Uncle

PST DATE: 29 Nov 1951 29 Nov 1951 2000 1200

Sponsor: DOD - LASL

NTS - Area 10 37° 10' 11" N

TOTAL YIELD: 1.2 kt

116° 02' 33" W Site elevation: 4,299 ft

HEIGHT OF BURST: -17 ft Underground

FIREBALL DATA:

Time to 1st minimum: NM Time to 2nd maximum: NM Radius at 2nd maximum:

TYPE OF BURST AND PIACEMENT: Underground burst - Filled shaft in Nevada soil

CLOUD TOP HEIGHT: 11,500 ft MSL CLOUD BOTTOM HEIGHT: Not available

Diameter: 260 ft Maximum dose rate: ~ 7500 r/hr at H+l hour CRATER DATA: Depth:

53 ft at crater lip

980,000 ft<sup>3</sup> Volume:

# REMARKS:

The contamination resulting from this shot was well documented to several thousand yards. The on-site pattern was drawn from the data and maps of three scientific projects and can be considered reliable. Direct measurements of radiation fields at one hour after burst were obtained with constant-recording scintillation counters. Additional readings were taken with AN/PDR-TIB survey meters over the period 24 to 70 hours after burst. These readings were corrected to the reference time of one hour by the use of the t-1.2 decay approximation. The off-site pattern is less reliable because only a limited number of readings were available.

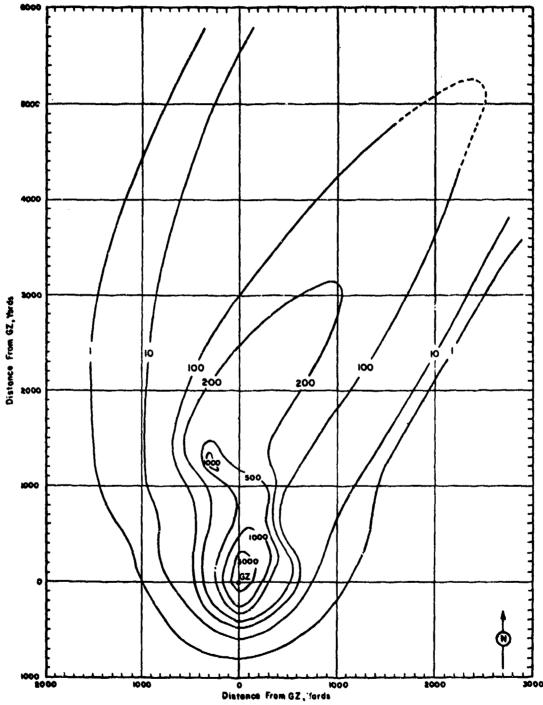


Figure 36. Operation BUSTER-JANGLE - Uncle.
On-site dose rate contours in r/hr at H+l hour.

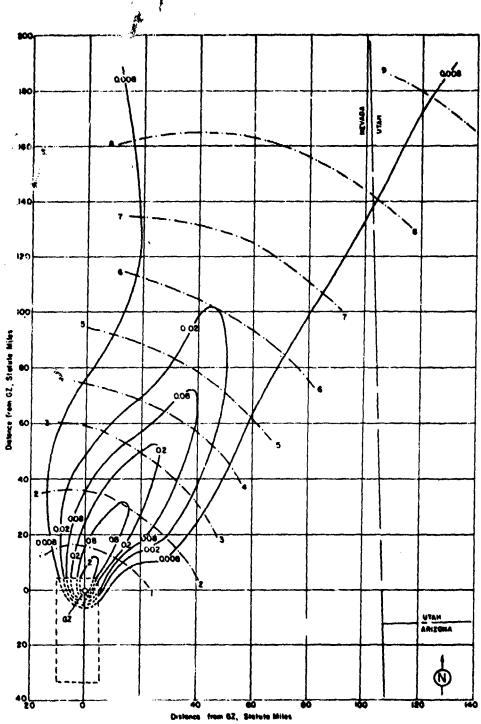


Figure 37. Opens BUSTER-JANGLE - Uncle.
Off-sice dose rate contours in r/hr at H+1 hour.

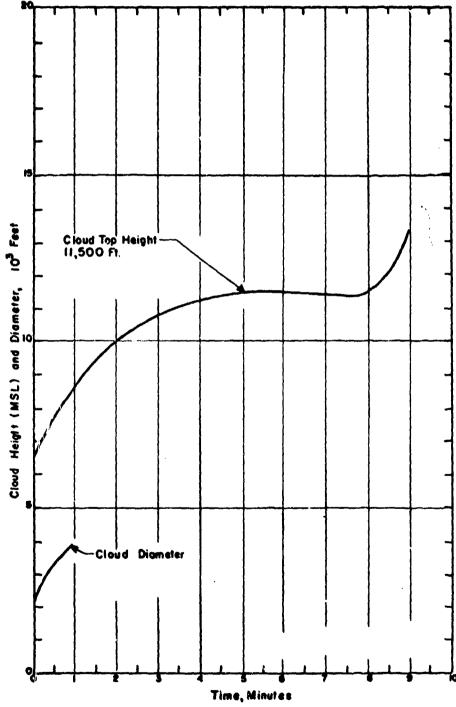


Figure 38. Cloud Dimensions: Operation BUSTER-JANGLE -

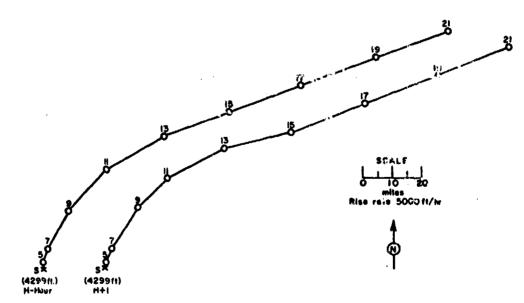
Uncle.

Altitude	H-ho	ur	H+1 hc	ur
(MSL)	Dir	Speed	Dir	Speed
feet	degrees	u <b>i</b> by	degress	mph
Surface	180	05	<b>040</b>	03
5,000			050	03
6,000	190	06	290	05
7,000		<b></b> ,	180	09
8,000	210	17	510	17
9,000			220	24
10,000	230	24	220	25
12,000	240	<b>2</b> 8	250	22
14,000	250	29	250	21
15,000	=		260	26
16,000	250	34	250	30
18,000	250	34	250	36
20,000	250	34	250	41
25,000	250	41	250	41
30,000	250	<b>4</b> 3	250	43

#### NOTES:

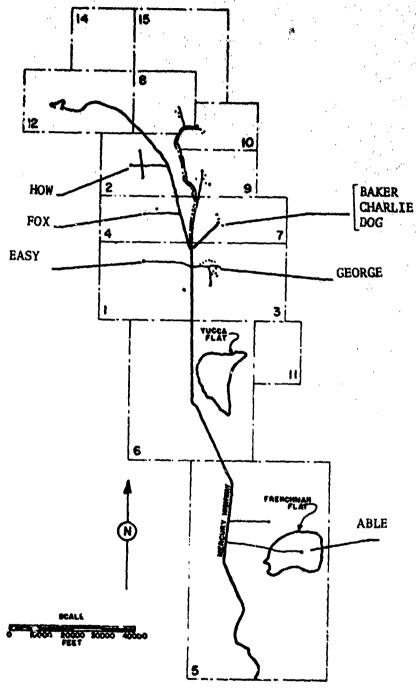
- 1. Wind data was obtained by the Mercury Weather Station
- located at the C. P.

  2. At H-hour the pressure at GZ was 872 mb, the temperature 14.5°C and the relative humidity 35%.



Hodographs for Operation BUSTER-JANGLE -Figure 39.

Uncle.



NEVADA TEST SITE

Figure 40. Cperation TUMBLER-SNAPPER, Shot Locations.

## OPERATION TUMBLER-SNAPPER - ABLE

PST CMT

DATE: 1 Apr 1952 1 Apr 1952

TIME: 0900 1700

OTOTA MEN TANANA

Sponsor: DOD - LASL

SITE: NTS - Frenchman Flat 36° 47' 54" N 115° 56' 08" W Site elevation: 3,077 ft

TOTAL YIELD: 1 kt

HEIGHT OF BURST: 793 ft

TYPE OF BURST AND PLACEMENT:
Air burst over Nevada soil

FIREBALL DATA:

Time to 1st minimum: 2.85 to 5.5 msec Time to 2nd maximum: 90 to 125 msec Radius at 2nd maximum: NM

of the Land of the state of the state of

CLOUD TOP HEIGHT: 16,200 ft MSL CLOUD BOTTOM HEIGHT: Not available

CRATER DATA: No crater

## REMARKS:

The contours resulting from this shot were due primarily to neutron-induced activity. Readings were taken by radiological safety survey teams working with test recovery parties on D day, D+1 day and D+2 day. These readings were extrapolated to H+1 hour, using the generalized decay curve for neutron-induced activity in Nevada soil

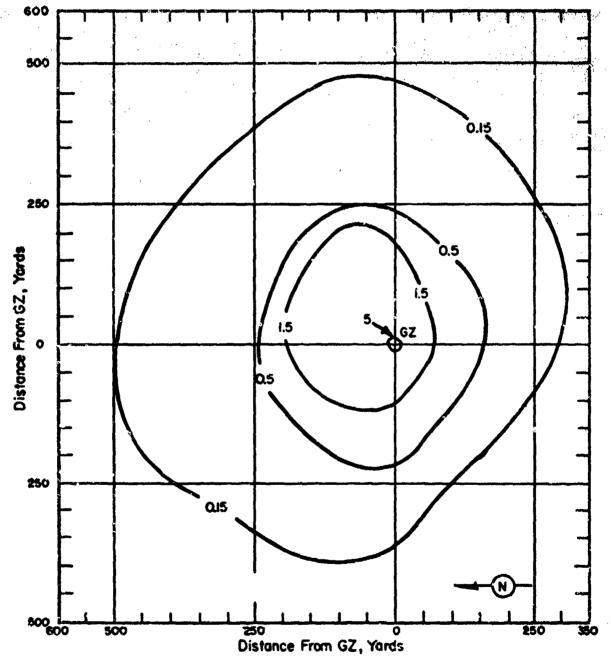


Figure 41. Operation TUMBLER-SNAPPER - ABLE On-site dose rate contours in r/hr at H+1 hour.

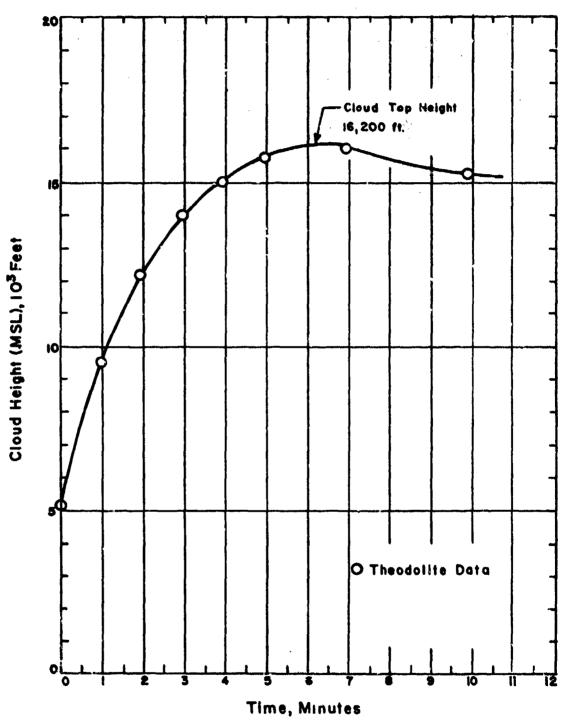


Figure 42. Cloud Dimensions: Operation TUMBLER-SNAPPER-ABLE

TABLE 14 NEVADA WIND DATA FOR OPERATION TUMBLER-SNAPPER -ABLE

Altitude	ff-hou	ır
(MSL)	Dir	Speed
feet	degrees	mph
Surface	050	07
5,000	090	06
6,000	120	06
7,000	140	08
8,000	170	-09
9,000	200	09
10,000	<b>510</b>	12
12,000	250	17
14,000	250	16
15,000	<b>26</b> 0	20
16,000	260	23
18,000	260	39
20,000	260	42
25,000	<b>26</b> 0	49
30,000	270	74

- 1. Wind data was obtained by the Mercury Weather Station located at the C. P.
- 2. Tropopause height was 42,000 ft MSL.
- 3. At H-hour the pressure at ground zero was 914 mb, the temperature 58°F and the relative humidity 28%.

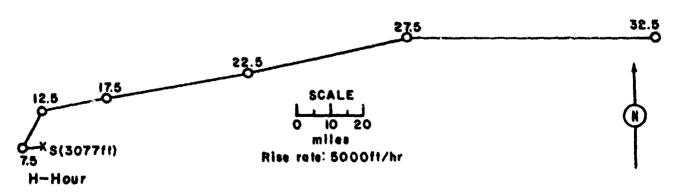


Figure 43. Hodograph for Operation TUMBLER-SNAPPER- ABLE

## OPERATION TUMBLER SNAPPER - BAKER

GMT Sponsor: DOD - LASL 15 Apr 1952 15 Apr 1952

DATE: SITE: NTS - Area 7 - Target 3 TIME: 0930 1730

37° 05' 03" N 116° 01' 10" W Site elevation: 4,193 ft

1,109 ft

TOTAL YIELD: 1 kt

HEIGHT OF BURST:

TYPE OF BURST AND PLACEMENT: Air burst over Nevada soil

CRATER DATA: No crater

FIREBALL DATA:

Time to 1st minimum: 3 to 5 msec CLOUD TOP HEIGHT: 15,700 ft MSL

Time to 2nd maximum: 90 to 105 msec

Radius at 2nd maximum: 10,000 ft MSL CLOUD BOTTOM HEIGHT:

# REMARKS:

The contours resulting from this shot were due primarily to neutroninduced activity. Readings were taken by radiological safety survey teams on D day, D+1 day, D+2 days, and D+3 days along eight radial lines of numbered wooder stakes placed 100 yards apart. The readings were extrapolated to H+1 hour using the decay curve for neutron-induced activity in Nevada soil

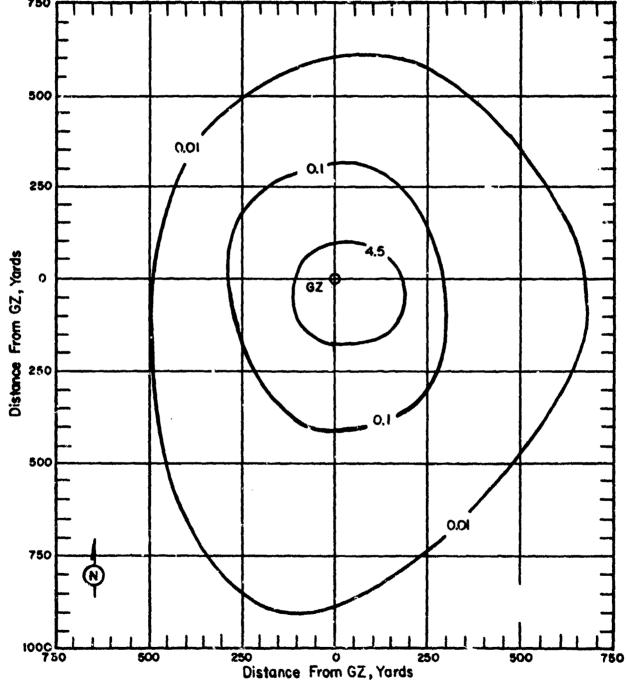


Figure 44. Operation TUMBERL-SNAPPER - BAKER On-site dose rate contours in r/hr at H+l hour.

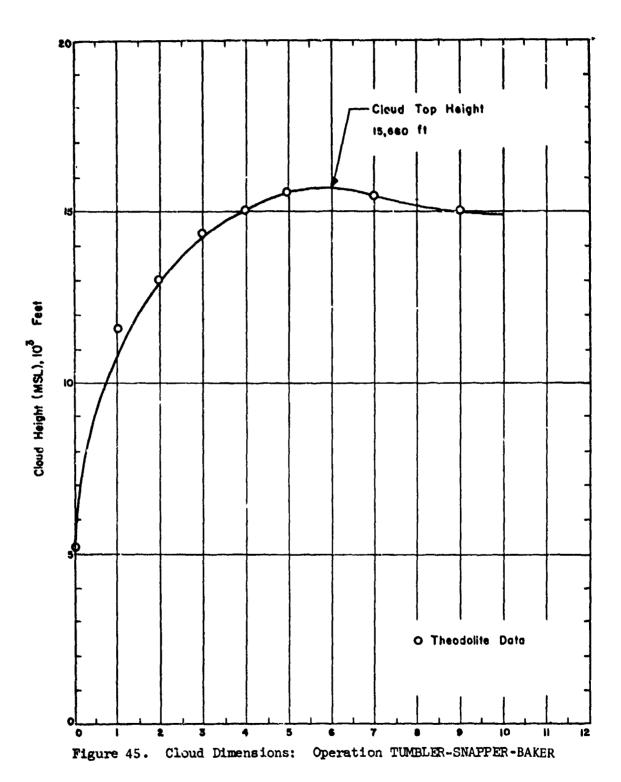


TABLE 15 NEVADA WIND DATA FOR OPERATION TUMBLER-SNAPPER-BAKER

Altitude	H-hou	r	Altitude	H-hou	T
(MSL)	Dir	Speed	(MSL)	Dir	Speed
feet	degrees	mph	feet	degr <b>ee</b> s	mph
Surface	050	07	16,000	31.0	51
5,000	040	07	18,000	310	21
6,000	040	70	20,000	300	29
7,000	050	10	25,000	270	35
8,000	040	14	30,000	260	40
9,000	030	14	35,000	260	25
10,000	360	10	40,000	270	32
12,000	340	09	45,000	270	46
14,000	320	10	50,000	270	46
15,000	310	16	55,000	270	26

- 1. Wind data was obtained by the Mercury Weather Station located at the C. P.
- 2. Tropopause height was 38,000 ft MSL.
- 3. At H-hour the pressure at ground zero was 378 mb, the temperature 52.8°F and the relative humidity 30%.

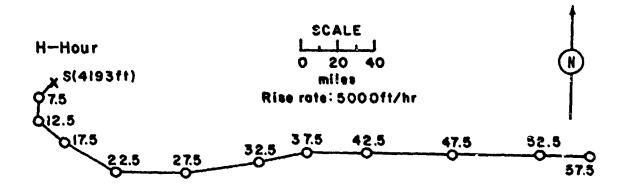


Figure 46. Hodograph for Operation - TUMBLER-SNAPPER-BAKER

## OPERATION TUMBLER-SNAPPER - CHARLIE

PST GMT Sponsor: DOD - LASL

DATE: 22 Apr 1952 22 Apr 1952 TIME: 0930 1730 SITE: NTS - Area 7 - Target 3

37° 05' 04" N 116° 01' 13" W

Site elevation: 4,193 ft

TOTAL YIELD: 31 kt HEIGHT OF BURST: 3,447 ft

TYPE OF BURST AND PLACEMENT:
Air burst over Nevada soil

FIREBALL DATA:

Time to 1st minimum: 15 to 18.5 msec Time to 2rd maximum: 150 to 190 msec

Radius at 2nd maximum: NM CLOUD TOP HEIGHT: 42,000 ft MSL

CLOUD BOTTOM HEIGHT: 31,000 ft MSL

CRATER DATA: No crater

#### REMARKS:

The contours resulting from this shot were due primarily to neutron-induced activity. Readings were taken on D day and D+1 day by the radiological safety survey teams along eight radial lines of numbered wooden stakes placed 100 yards apart. These readings were extrapolated to H+1 hour, using the decay curve for neutron-induced activity in Nevada soil

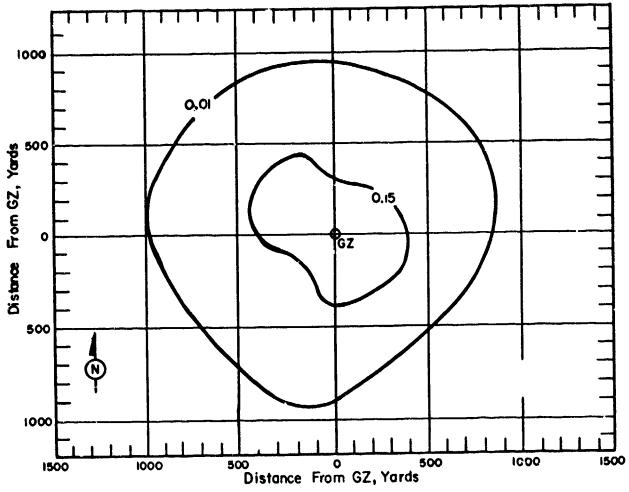


Figure 47. Operation TUMBLER-SNAPPER - CHARLIE On-site dose rate contours in r/hr at H+1 hour.

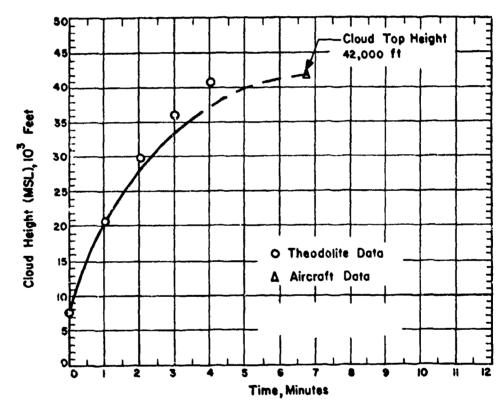


Figure 48. Cloud Dimensions: Operation TUMBLER-SNAPPER-CHARLIE

TABLE 16 NEVADA WIND DATA FOR OPERATION TUMBLER-SNAPPER-CHARLIE

Altitude	H-ho	ur	Altitude	tude H-hour	
(MSL)	Dir	Speed	(MSL)	Dir	Speed
feet	dogrees	mbp	feet	degrees	mph
Surface	230	07	15,000	330	18
5,000	220	09	16,000	330	16
6,000	550	09	18,000	330	15
7,000	<b>5</b> 10	80	20,000	340	17
8,000	510	06	25,000	330	18
9,000	240	03	30,000	310	33
10,000	290	06	35,000	290	17
12,000	350	09	40,000	270	25
14,000	360	18	45,000	250	32

- 1. Wind data was obtained by the Mercury Weather Station located at the C. P.
- 2. Tropopause height was 38,000 ft MSL.
- 3. At H-hour the pressure at ground zero was 873 mb, the temperature 66.1°F and the relative humidity 30%.

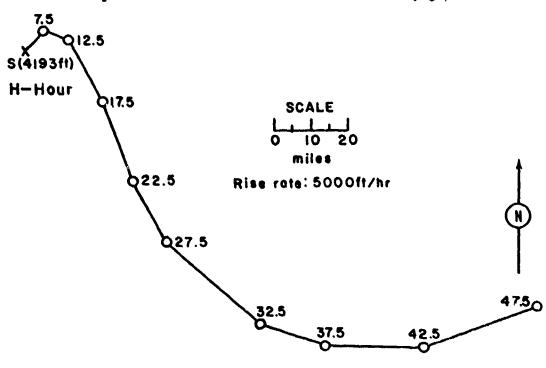


Figure 49. Hodograph for Operation TUMBLER-SNAPPER-CHARLIE

# OPERATION TUMBLER-SNAPPER - DOG

PST DATE: 1 May 1952 1 May 1952 Sponsor: LASL

TIME: 0830 1630

Site: NTS - Area 7 - Target 3 37° 05' 03" N 116° 01' 13" W Site elevation: 4,193 ft

TOTAL YIFLD: 19 kt

HEIGHT OF BURST: 1,040 ft

TYPE OF BURST AND PLACEMENT: Air burst over Nevada soil

FIREBALL DATA:

Time to 1st minimum: 12.7 to 15 msec Time to 2nd maximum: 130 to 160 msec

44,000 ft MSL CLOUD TOP HEIGHT: 28,000 ft MSL CLOUD BOTTOM HEIGHT:

Radius at 2nd maximum: NM

CRATER DATA: No crater

# REMARKS:

The contours resulting from this shot were due primarily to neutroninduced activity. Readings were taken by radiological survey teams along eight radial lines of numbered wooden stakes placed 100 yards apart. These readings were taken between H+35 minutes and H+66 minutes. No decay corrections were made.

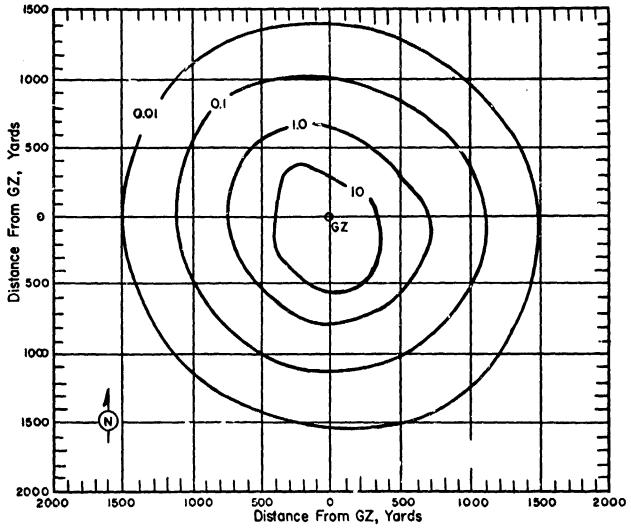


Figure 50. Operation TUMBLER-SNAPPER - DOG on-site dose rate contours in r/hr at H+l hour.

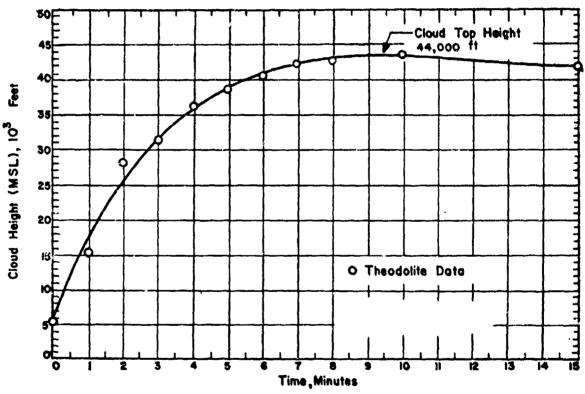


Figure 51. Cloud Dimensions: Operation TUMBLER-SNAPPER-DOG

TABLE 17 NEVADA WIND DATA FOR OPERATION TUMBLER-SNAPPER-DOG

Altitude	H-hc	านา	Altitude	H-hc	ur
(MSL)	Dir	Speed	(MSL)	Dir	Speed
feet	degrees	mph	feet	degrees	ndby
Surrace	020	03	14,000	250	14
5,000	240	05	15,000	260	18
6,000	210	07	16,000	280	22
7,000	200	10	18,000	270	30
8,000	190	13	20,000	260	36
9,000	180	14	25,000	260	24
10,000	190	15	30,000	<b>2</b> 50	44
12,000	190	14	35,000	260	47

- 1. Wind data was obtained by the Mercury Weather Station located at the C. P.
- 2. Tropopause height was 38,000 ft MSL.
- 3. At H-hour the pressure at ground zero was 877 mb, the temperature 62.8°F and the relative humidity 47%.

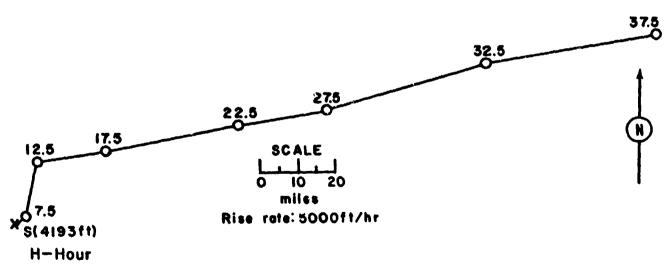


Figure 52. Hodograph for Operation TUMBLER-SNAPPER-DOG

OPERATION TUMBLER - SNAPPER - EASY

PST GMP

DATE: 7 May 1952 7 May 1952

TIME: 0415 1215

Sponsor: LASL

SITE: NTS - Area T-1 37° 03' 11" N 116° 06' 20" W

TOTAL YIELD: 12 kt

Site elevation: 4,329.25 ft

HEIGHT OF BURST: 300 ft

TYPE OF BURST AND PLACEMENT:
Tower burst over Nevada soil

FIREBALL DATA:

Time to 1st minimum: 9.5 to 12.5 msec

Time to 2nd maximum: 95
Radius at 2nd maximum: NM

CLOUD TOP HEIGHT:

34,000 ft MSL

CLOUD BOTTOM HEIGHT: Not available

CRATER DATA: No crater

## REMARKS:

The on-site fallout pattern was obtained from readings of radiological survey teams on D+1 day along eight radial lines of numbered stakes 300 feet apart. The stakes within approximately 1200 to 1500 feet of ground zero were destroyed or blown down so that they did not provide adequate reference points. The survey readings were extrapolated to H+1 hour by using the  $t^{-1\cdot 2}$  decay approximation. The off-site readings were obtained by ground mobile monitors of the Radiological Safety organization on D-day. These readings were extrapolated to H+1 hour by using the  $t^{-1\cdot 2}$  decay approximation.

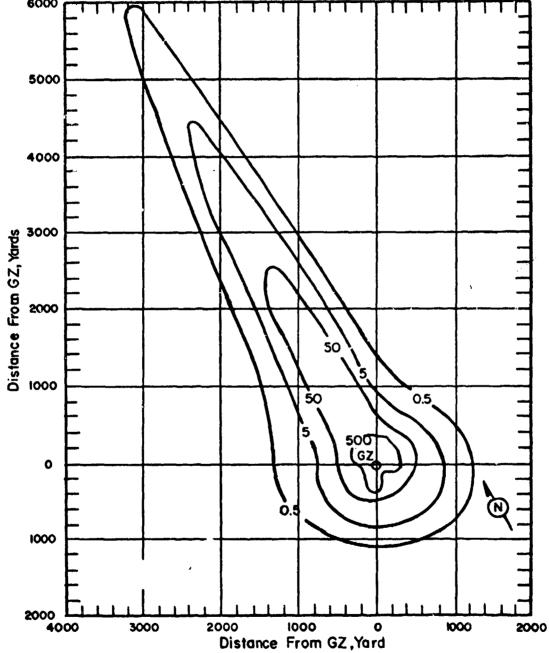


Figure 53. Operation TUMBLER-SNAPPER-EASY. On-site dose rate contours in r/hr at H+l hour.

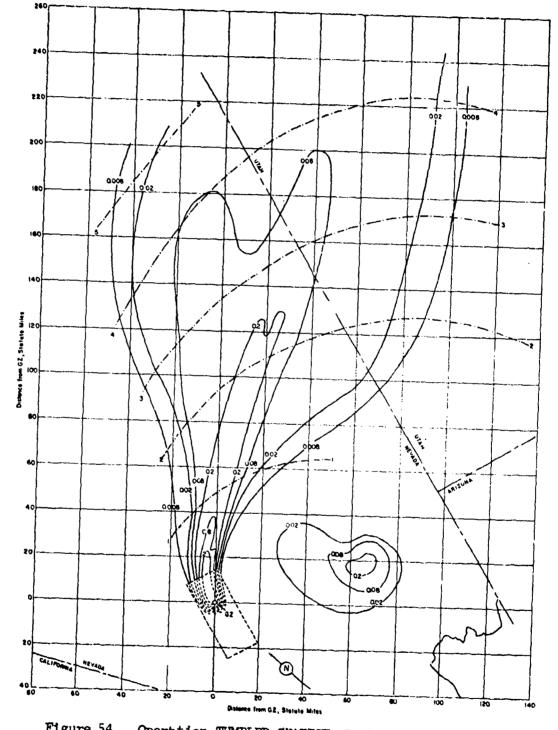


Figure 54. Operation TUMBLER-SNAPPER-EASY Off-site dose rate contours in r/hr at H+l hour.

TABLE 18' NEVADA WIND DATA FOR OPERATION TUMBLER-SNAPPER- EASY

Altitude	H-hour		Altitude	H-hor	ur
(MSL)	Dir	Speed	(MSL)	Dir	Speed
feet	degrees	mph	feet	degrees	mph
Surface	Calm	Calm	12,000	190	52
4,000	Calm	Calm	14,000.	190	62
5,000	Calm	Calm	15,000	190	56
6,000	180	23	16,000	<b>S</b> 10	55
7,000	180	30	18,000	210	67
8,000	180	37	20,000	220	77
9,000	190	40	25,000	<b>22</b> 0	90
10,000	180	41	30,000	220	107

- 1. Wind data was obtained by the Mercury Weather Station located at the C. P.
- 2. Tropopause height was 41,000 ft MSL.
- 3. At H-hour the pressure at ground zero was 868 mb, the temperature 60.5°F and the relative humidity 40%.

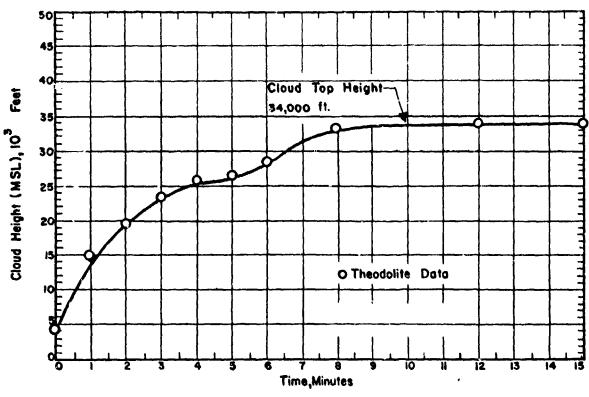


Figure 55. Cloud Dimensions: Operation TUMPLER-SNAPPER-EASY

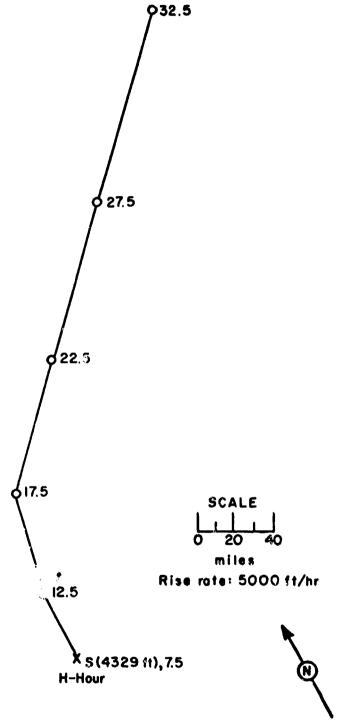


Figure 56. Hodograph for Operation TUMBLER-SNAPPER-EASY

#### OPERATION TUMBLER-SNAPPER - FOX

PST DATE: 25 May 1952 25 May 1952 0400

1200

TOTAL YIELD: 11 kt

FIREBALL DATA:

Sponsor: LASL

SITE: NTS - Area 4 37° 05' 44" 116° 06' 20" W

Site elevation: 4,309 ft

HEIGHT OF BURST: 300 ft

TYPE OF BURST AND PLACEMENT: Tower burst over Nevada soil

Time to 1st minimum: 10 to 13 msec Time to 2nd maximum: 110 msec

Radius at 2nd maximum: NM

41,000 ft MSL CLOUD TOP HEIGHT: CLOUD BOTTOM HEIGHT: Not available

CRATER DATA: No crater

## REMARKS:

The on-site fallout pattern was obtained from readings of radiological survey teams from D-day through D+3 days along eight radial lines of numbered stakes, 300 feet apart. Although part of the contamination from this shot overlapped that resulting from the previous tower shot, the old contamination had a negligible influence on the dose rates. The survey readings were extrapolated to H+1 hour by using the t-1.2 decay approximation. The off-site readings were obtained by ground mobile monitors of the Radiological Safety organization from D-day through D+2 days.

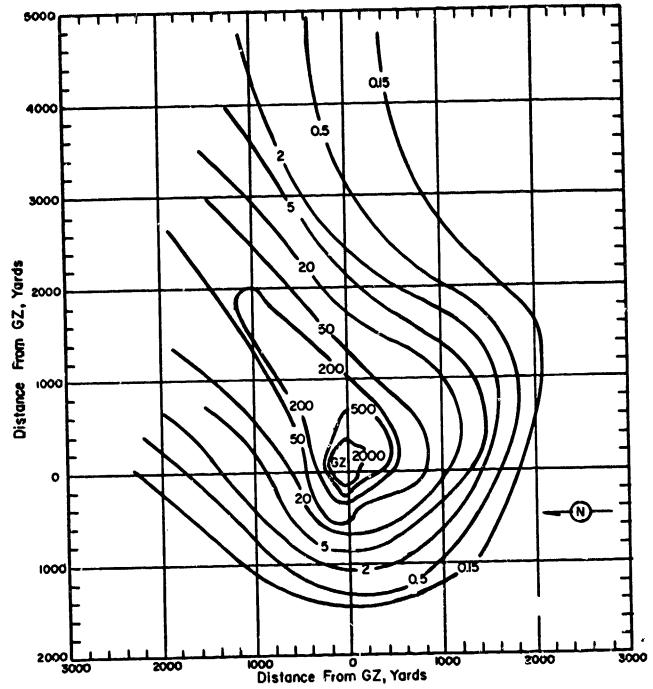


Figure 57. Operation TUMBLER-SNAPPER - FOX On-site dose rate contours in r/hr at H+l hour.

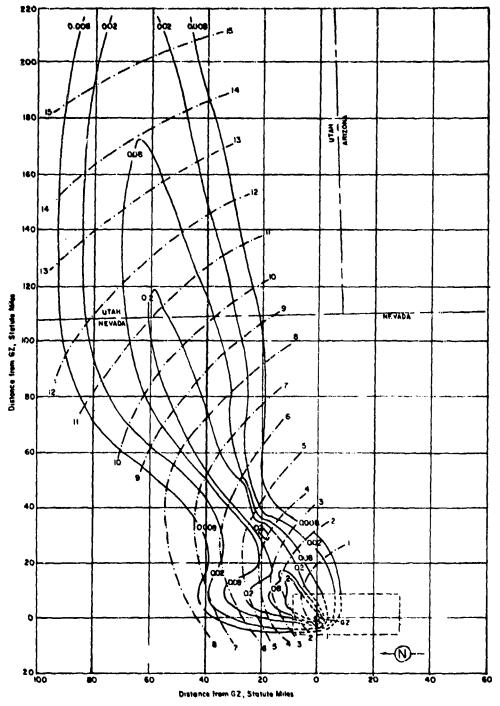


Figure 58. Operation TUMBLER-SNAPPER - FOX Off-site dose rate contours in r/hr at H+1 hour.

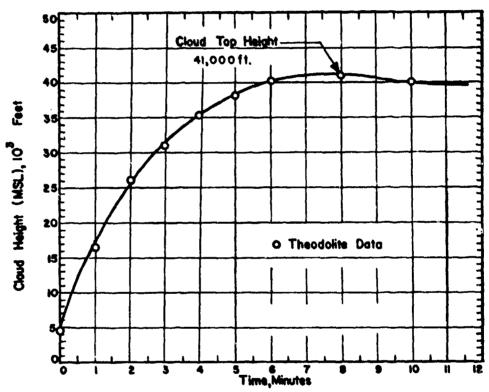


Figure 59. Cloud Dimensions: Operation TUMBLER-SNAPPER-FOX

TABLE 19 NEVADA WIND DATA FOR OPERATION TUMPLER-SNAPPER-FOX

Altitude	H-hc	ur	Altitude	H-he	ur
(MSL)	Dir	Speed	(MSL)	Dir	Speed
feet	degrees	mph	feet	degrees	mby
Surface	Calm	Calm	14,000	200	07
5,000	510	02	15,000	150	05
6,000	210	09	16,000	120	07
7,000	550	13	18,000	140	10
8,000	220	13	20,000	220	09
9,000	220	13	25,000	240	26
10,000	220	15	30,000	230	29
12,000	210	10	35,000	240	40

- 1. Wind data was obtained by the Mercury Weather Station located at the C. P.
- 2. Tropopause height was 37,000 ft MSL.
- 3. At H-hour the pressure at ground zero was 868 mb, the temperature 57.1°F and the relative humidity 41%.

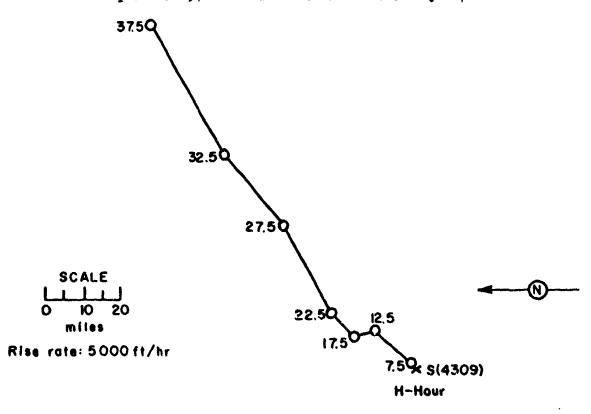


Figure 60. Hodograph for Operation TUMBLER-SNAPPER-FOX

#### OPERATION TUMBLER-SNAPPER-GEORGE

GMT 1 Jun 1952 1 Jun 1952 DATE:

Sponsor: LASL

TIME: 1155 0355

SITE: MTS - Area 3 37° 02' 53" W 116° 01' 16" W

Site elevation: 4,027.56 ft

TOTAL YIELD: 15 kt

HEIGHT OF BURST: 300 ft

FIREBALL DATA:

T me to 1st minimum: 8.5 to 14.5 msec Time to 2nd maximum: 120 msec

Radius at 2nd maximum: NM

TYPE OF BURST AND PLACEMENT: Tower burst over Nevada soil

CRATER DATA: No crater

CLOUD TOP HEIGHT: CLOUD BOTTOM HEIGHT:

37,000 ft MSL Not available

## REMARKS:

The on-site fallout pattern was obtained from readings of radiological survey teams from D-day through D+2 days along eight radial lines of numbered stakes 300 feet apart. These readings were extrapolated to H+1 hour by using the  $t^{-1.2}$  decay approximation. The off-site fallout pattern was drawn from the readings taken by ground mobile monitors of the Radiological Safety organization on D.Day. The t.1.8 decay approximation was used to extrapolate the dose-rate readings to H+1 hour.

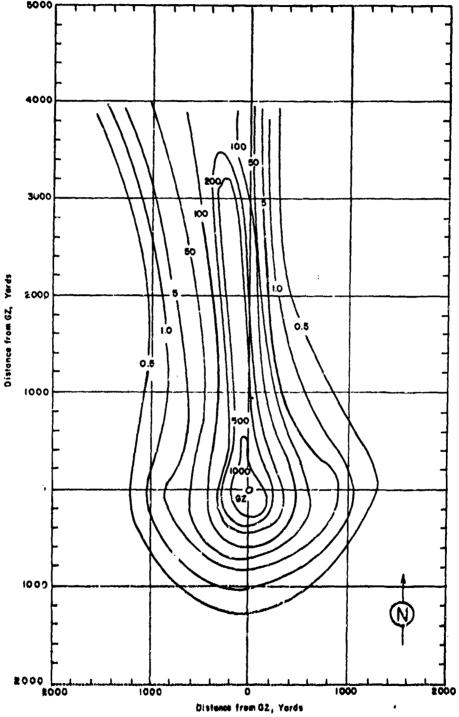


Figure 61. Operation TUMBLER-SNAPPER-GEORGE on-site dose rate contours in r/hr at H+1 hour.

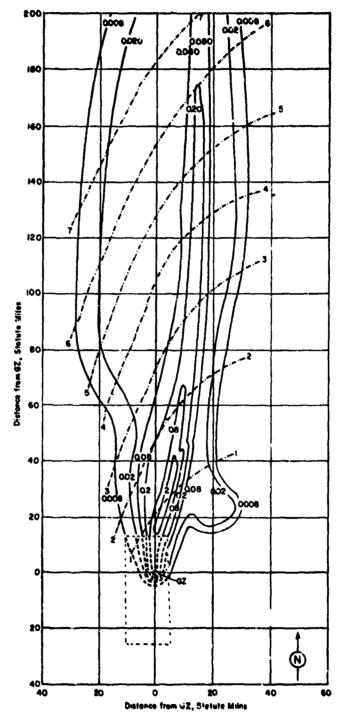


Figure 62. Operation TUMBLER-SNAPPER-GEORGE Off-site dose rate contours in r/hr at H+1 hour.

TABLE 20 NEVADA WIND DATA FOR OPERATION TUMBLER-SNAPPER-GEORGE

Altitude	H-hour		Altitude	H-hour	
(MSL)	Dir	Speed	(MSL)	Dir	Speed
feet	degrees	mph	feet	degrees	mby
Surface	Calm	Calm	14,000	180	30
5,000	Calm	Calm	15,000	170	30
6,000	170	20	16,000	170	33
7,000	170	21	18,000	190	35
8,000	170	20	20,000	190	Šì
9,000	160	20	25,000	200	48
10,000	160	17	30,000	190	41
12,000	180	20	• ,	•	

- 1. Wind data was obtained by the Mercury Weather Station located at the C. P.
- 2. Tropopause height was 37,000 ft MSL.
- 3. At H-hour the pressure at ground zero was 872 mb, the temperature 52.6°F and the relative humidity 48%.

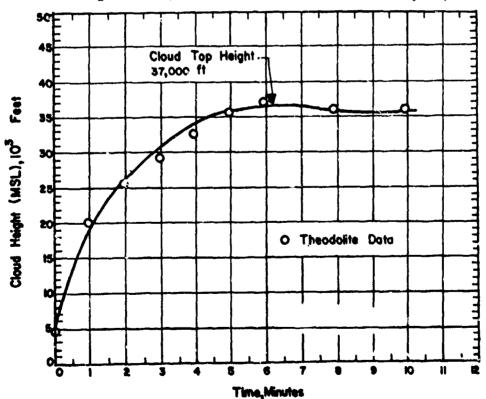


Figure 63. Cloud Dimensions: Operation TUMBLER-SNAPPLK-GEORGE

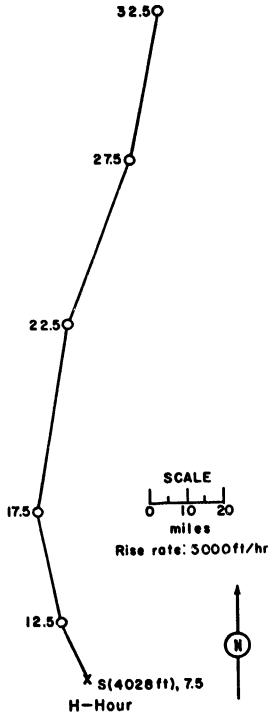


Figure 64. Modograph for Operation TUMBLER-SNAPPER-GEORGE

#### OPERATION TUMBLER-SNAPPER - HOW

PST GMT

DATE: 5 Jun 1952 5 Jun 1952

TIME: 0355 1155

TOTAL YIELD: 14 kt

FIREBALL DATA:

Time to 1st minimum: 9 to 11 msec

Time to 2nd maximum: NM Radius at 2nd maximum: NM

CRATER DATA: No crater

Sponsor: LASL

SITE: NTS - Area 2

37° 08' 19" N 116° 07' 04' W

Site elevation: 4,492 ft

HEIGHT OF BURST: 300 ft

TYPE OF BURST AND PLACEMENT:
Tower burst over Nevada soil

CLOUD TOP HEIGHT: 41,800 ft MSL CLOUD BOTTOM HEIGHT: Not available

## REMARKS:

The on-site fallout pattern was obtained from readings of radiological survey teams from D-day through D+4 days along radial lines of numbered stakes 300 feet apart. These readings were extrapolated to H+1 hour by using the  $t^{-1\cdot 2}$  decay approximation. The close-in fallout was deposited in the mountains, and, therefore, the on-site isointensity lines were not closed. The off-site fallout pattern was drawn from the readings taken on D-day by ground mobile monitors of the Radiological Safety organization, using the  $t^{-1\cdot 2}$  decay approximation to extrapolate to H+1 hour.

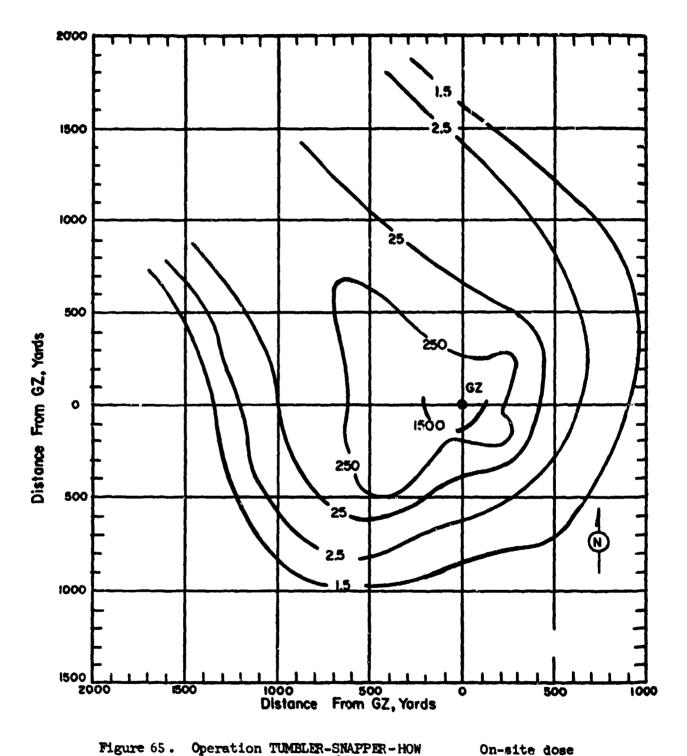


Figure 65. Operation TUMBLER-SNAPPER-HOW rate contours in r/hr at n+1-hour.

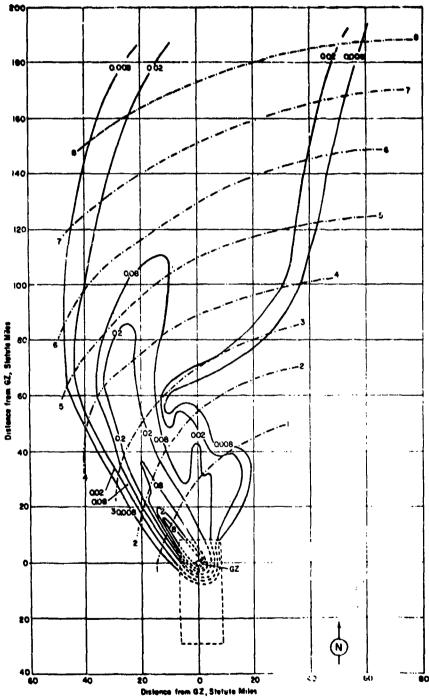


Figure 66. Operation TUMBLER-SNAPPER-HOW Off-site dose rate contours in r/hr at H+1 hour.

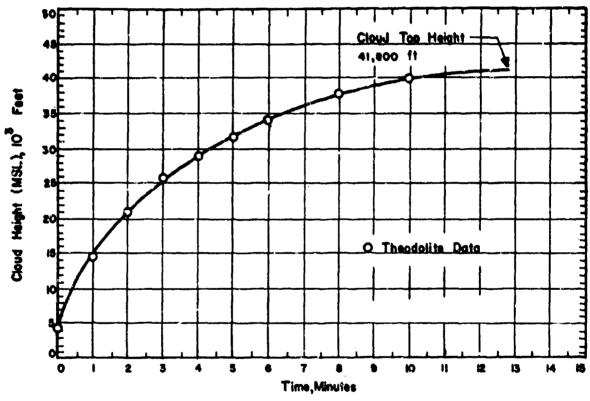


Figure 67. Cloud Dimensions: Operation TUMBLER-SNAPPER-HOW

TABLE 21 NEVADA WIND DATA FOR OPERATION TUMBLER-SNAPTER-HOW

Altitude	H-hou	r	Altitude	H-hou	r
(MSL)	Dir	Speed	(MSL)	Dir	Speed
feet	degrees	mby	feet	degrees	<b>m</b> Dy
Surface	Calm	Calm	14,000	120	<b>29</b>
5,000	Calm	Calm	15,000	120	58
6,000	210	06	16,000	120	25
7,000	170	07	18,000	150	55
8,000	150	07	20,000	150	17
9,000	140	13	25,000	160	25
10,000	140	15	30,000	150	29
12,000	130	20			

- 1. Wind data was obtained by the Mercury Weather Station located at the C. P.
- 2. Tropopause height was 40,000 ft MSL.
- 3. At H-hour the pressure at ground zero was 863 mb, the temperature 64.0°F and the relative humidity 45%.

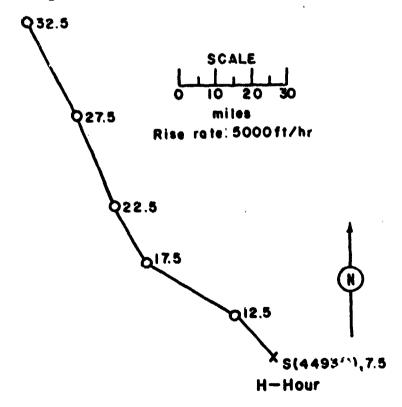
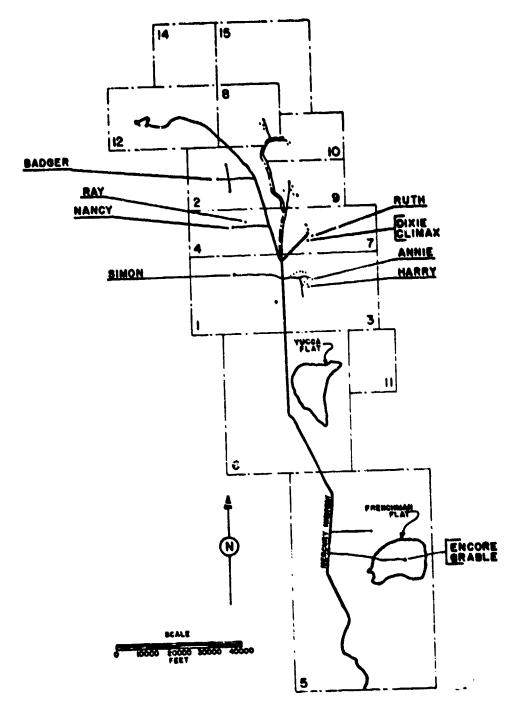


Figure 68. Hodograph for Operation TUMBLER-SNAPPER-HOW



NEVADA TEST SITE

Figure 69. Operation UPSHOT-KNOTHOLE, Shot Locations.

OPERATION UPSHOT-KNOTHOLE -

Annie

17 Mar 1953 17 Mar 1953 Sponsor: LASL

DATE: TIME: 0520 1320

SITE: NTS - Area 3 370 021 52" 116° 01' 16" W

Site elevation: 4,026 ft

TOTAL YIELD: 16 kt

HEIGHT OF BURST: 300 ft

TYPE OF BURST AND PLACEMENT: Tower burst over Nevada soil

FIREBALL DATA:

Time to 1st minimum: 14.3 to 14.5 msec

Time to 2nd maximum: 122 msec Radius to 2nd maximum: NM

CLOUD TOP HEIGHT: 41,000 ft MSL CLOUD BOTTOM HEIGHT: 28,000 ft MSL

CRATER DATA: No crater

## REMARKS:

The on-site fallout pattern is based upon readings obtained by radiological ground survey teams from D-day to D+3 days. The locations of the points at which readings were taken were approximated. The offsite fallout pattern was drawn from readings on D-day through D+3 day by ground mobile monitors of the Radiological Safety organization. The t-1.2 decay approximation was used to extrapolate both the on-site and off-site dose rates to H+1 hour.

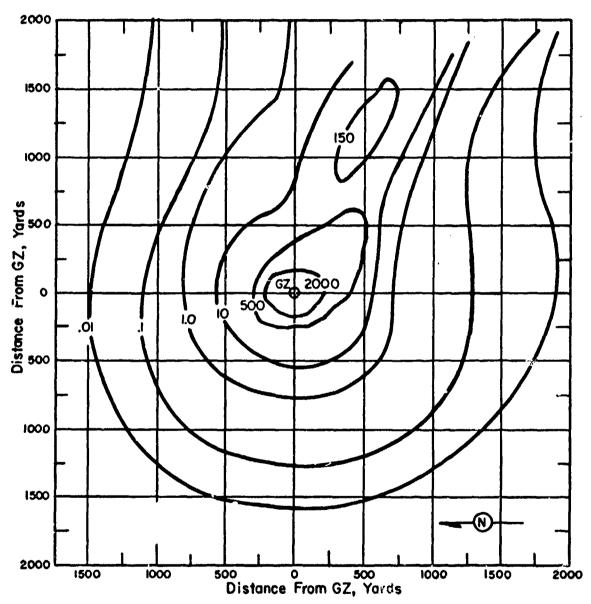


Figure 70. Operation UPSHOT-KNOTHOLE - Annie.
On-sit: dose rate contours in r/hr at H+l hour.

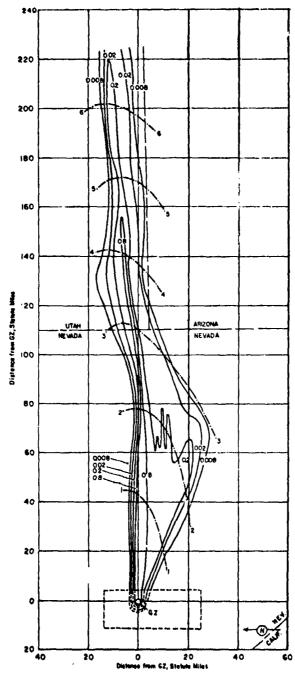


Figure 71. Operation UPSHOT-KNOTHOLE - Annie Off-site dose rate contours in r/hr at H+l hour.

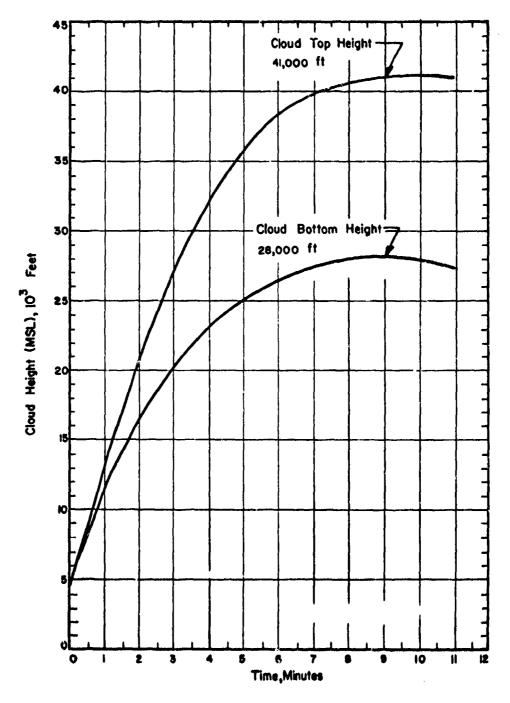


Figure 72. Cloud Dimensions: Operation UPSHOT-KNOTHOLE -

Annie.

Altitude	H-hou	ır	Altitude	H-hou	
(MSL)	Dir	Speed	(MSL)	Dir	Speed
feet	degrees	mph	feet	degrees	mbp
Surface	Variable	Light	27,000	270	57
Burst Height	250	02	28,000	270	60
5,000	250	05	29,000	270	69
6,000	290	09	30,000	270	78
7,000	270	10	31,000	270	76
8,000	280	07	32,000	270	74
9,000	270	28	33,000	270	69
10,000	270	29	34,000	260	64
11,000	270	29	35,000	260	61
12,000	270	29	36,000	260	69
13,000	270	26	37,000	260	75
14,000	270	24	38,000	260	81
15,000	280	37	39,000	260	92
16,000	280	39	40,000	260	102
17,000	280	44	41,000	260	90
18,000	270	48	42,000	260	84
19,000	270	55	43,000	260	80
20,000	270	62	44,000	260	76
21,000	270	57	45,000	260	72
22,000	270	53	46,000	260	70
23,000	270	49	47,000	250	69
24,000	270	46	48,000	250	68
25,000	270	54	49,000	240	66
26,000	270	54	50,000	240	66

- 1. Tropopause height was 37,000 ft MSL at H-hour.
- 2. Surface wind data were obtained at the Control Point. Upper air data were obtained from the rawinsonde section located on Yucca Lake.
- 3. At H-hour the pressure at ground zero was 876 mb, the temperature 2.7°C, the dew point -8.5°C and the relative humidity 43%.

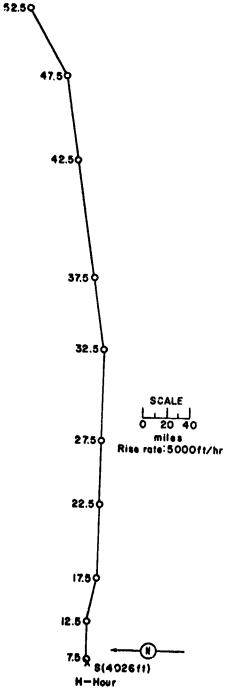


Figure 73. Hodograph for Operation UPSHOT-KNOTHOLE - Annie.

Nancy

GMT

DATE: 24 Mar 1953 TIME: 0510

24 Mar 1953

1310

Sponsor: LASL

NTS - Area 4

37° 05' 44" N 116° 06' 10" W

Site elevation: 4,309 it

TOTAL YIELD: 24 kt

HEIGHT OF BURST: 300 ft

TYPE OF BURST AND PLACEMENT: Tower burst over Nevada soil

FIREBALL DATA:

Time to 1st minimum: 17.5 to 18.5 msec

Time to 2nd maximum: 166 msec Radius at 2nd maximum: NM

CLOUD TOP HEIGHT: 41,500 ft MSL CLOUD BOTTOM HEIGHT: 26,000 ft MSL

CRATER DATA: No crater

## REMARKS:

The on-site fallout pattern is based upon readings obtained by radiological ground survey teams on D-day. The off-site fallout pattern was drawn from D-day ground surveys made by the Radiological Safety organization. The t-1 2 decay approximation was used to extrapolate the dose rates to H+1 hour for both the on-site and off-site patterns.

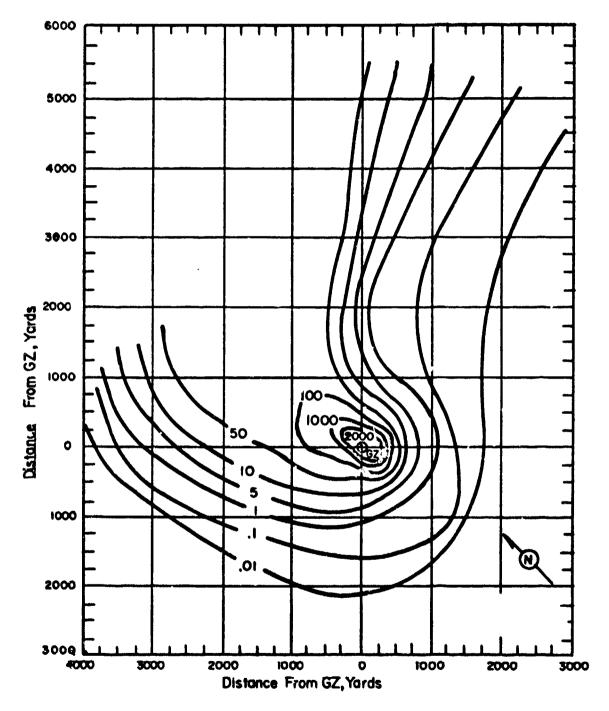


Figure 74. Operation UPSHOT-KNOTHOLE - Nancy.
On-site dose rate contours in r/hr at H+1 hour.

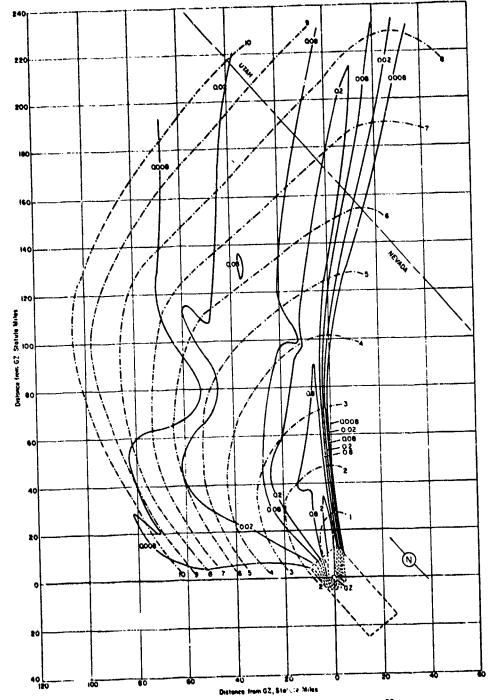


Figure 75. Operation UPSHOT-KNOTHOLE - Nancy.
Off-site dose rate contours in r/hr at H+l hour.

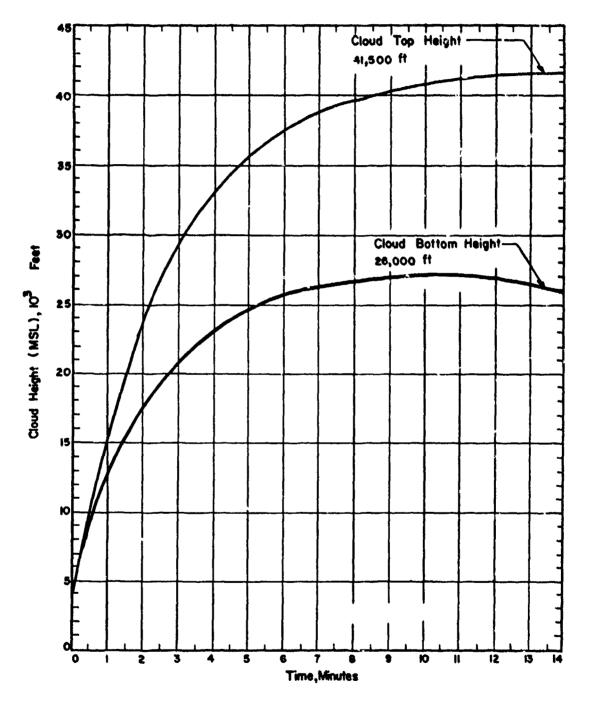


Figure 76 Cloud Dimensions: Operation UPSHOT-KNOTHOLE -

Nancy.

TABLE 23 WIND DATA FOR OPERATION UPSHOT-KNOTHOLE-

NANCY

	Test S		Warm Sprin			Test S		arm Spring	s,
Alt	H-ho	ur	H+2 h	ours	Alt	H-hc	ur	H+2 1	ours
(MSL)	Dir	Speed	Dir	Speed	(MSL)	Dir	Speed	Dir	Sp
feet	degrees	mph	degrees	mph	feet	degrees	myh	degrees	mp:.
Surface	310	02	Calm	Calm	27,000	550	29		••
Burst									
Height	Calm	Calm			28,000	<b>2</b> 10	32	510	37
5,000	Calm	Calm		b- 10	29,000	230	29		
6,000	<b>5</b> 10	18	Calm	Calm	30,000	550	36	550	37
7,000	150	14	180	09	31,000	230	39		
8,000	150	18	160	17	32,000	230	34		
9,000	150	14			33,000	220	33		
10,000	150	14	150	26	34,000	550	36		
11,000	160	15	160	31	35,000	210	31	210	50
12,000	170	10	180	29	36,000	210	32		
13,000	200	21			37,000	220	31		
14,000	200	21	200	32	38,000	550	35		
15,000	220	14	200	31	39,000	<b>55</b> 0	37		
16,000	210	18	200	30	40,000	550	37	210	50
17,000	210	14			41,000	220	37		
18,000	190	ે.3	200	26	42,000	<b>55</b> -)	43		
19,000	180	17			43,000	550	45		
20,000	210	23	200	35	44,000	550	36		
21,000	<b>22</b> 0	29			45,000	220	42	220	50
22,000	<b>5</b> 20	28	190	35	46,000	550	40		
23,000	230	<b>2</b> 9			47,000	220	47	220	52
24,000	210	29	200	44	48,000	230	35		
25,000	510	29	200	41	49,000	230	31.		
26,000	510	29			50,000	230	29		-

- 1. Tropopause height was 39,300 ft MSL at H-hcar.
- 2. H-hour surface wind data was obtained from the Control Point. H-hour upper air data was obtained from the rawinsonde section located on Yucca Lake. H+2 hour wind data was obtained from the pibal observation at Warm Springs.
- 3. At H-hour the pressure at ground zero was 870 mb, the temperature 9.9°C, the dew point -3.6°C and the relative humidity 39%.

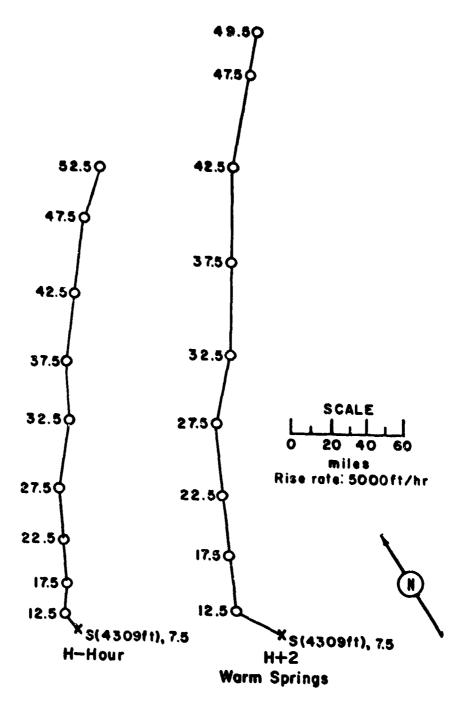


Figure 77. Hodographs for Operation UPSHOT-KNOTHOLE -

Nancy.

Ruth

31 Mar 1953 31 Mar 1953

Sponsor: UCRL

TIME: 0500 1300

SITE: NTS - Area 7 - 5a 37° 04' 58" 1" 116° 01' 26" W

TOTAL YIELD: 0.2 kt

Site elevation: 4,000 ft

304.69 ft HEIGHT OF BURST:

FIREBALL DATA:

Time to 1st minimum: 7.0 msec Time to 2nd maximum: 15 to 18 msec

Radius at 2nd maximum: NM

TYPE OF BURST AND PLACEMENT: Tower burst over Nevada soil

CRATER DATA: No crater

CLOUD TOP HEIGHT: 13,600 ft MSL CLOUD BOTTOM HEIGHT: 10,700 ft MSL

### REMARKS:

The on-site fallout pattern was obtained using H+1-hour readings of radiological survey teams. No decay correction was necessary. The off-site fallout pattern was drawn from D-day readings of mobile groundsurvey teams of the Radiological Safety organization. The  $t^{-1\cdot 2}$  decay approximation was used to extrapolate the off-site dose rates to H+1 hour.

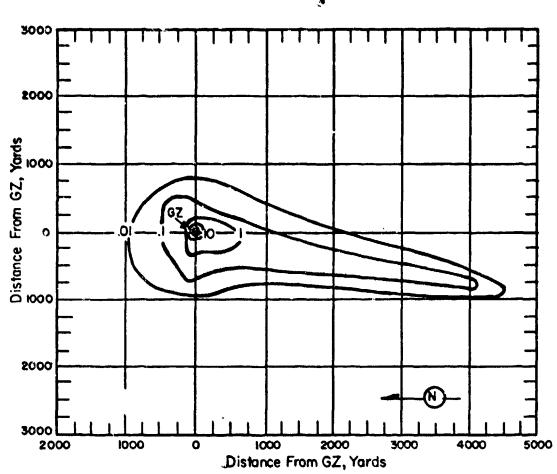


Figure 78. Operation UPSHOT-KNOTHOLE - Ruth.
On-site dose rate contours in r/hr at H+l hour.

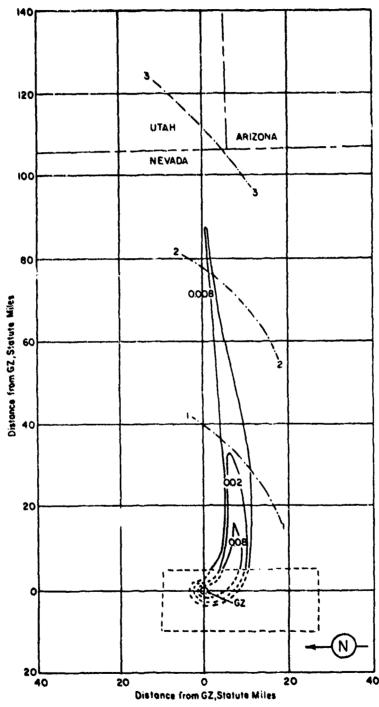


Figure 79. Operation UPSHOT-KNOTHCLE - Ruth.
Off-site dose rate contours in r/hr at H+l hour.

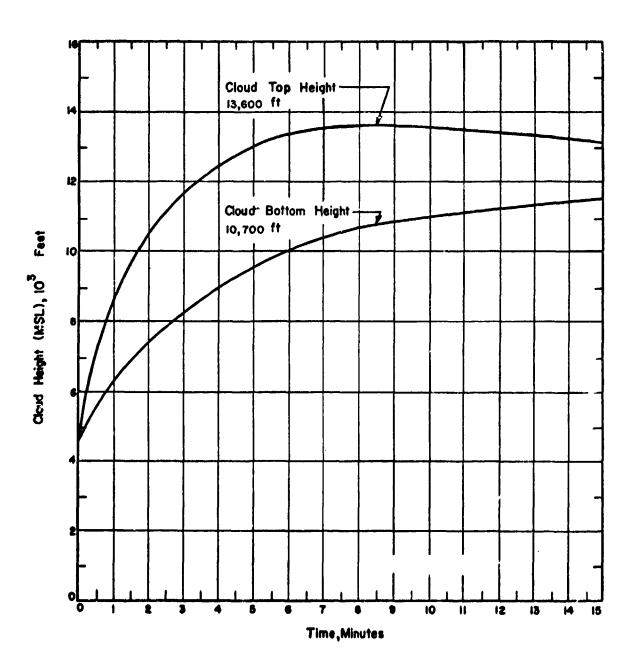


Figure 80. Cloud Dimensions: Operation UPSHOT-KNOTHOLE -

TABLE 24 WIND DATA FOR OPERATION UPSHOT-KNOTHOLE-

RUTH

	Test S		t George,	Nev.		Test S	ite S	t George,	Kev.
Altitude	H-ho		H+2 ho	urs	Altitude	H-ho	ur	H+2 ho	urs
(MSL)	Dir	Speed	Dir	Speed	(MSL)	Dir	Speed	Dir	Space
feet	degrees	mph	degrees	mph	feet	degrees	mph	degrees	mp.
Surface	360	05	Calm	Calm	27,000	330	39		
rst Height	020	08			28,000	<b>3</b> 30	39	210	39
5,000	020	10	280	05	29,000	330	41		
6,000	010	14	280	10	30,000	330	44	320	41
7,000	360	14	280	15	31,000	330	44		
8,000	350	15	310	12	32,000	330	39		
9,000	330	14			33,000	320	48		
10,000	310	21	320	10	34,000	320	51		
11,000	300	18			35,000	320	<b>55</b>	320	71
12,000	310	18	300	17	36,000	320	59	320	75
13,000	320	18			37,000	310	53		
14,000	320	23	290	26	38,000	<b>3</b> 00	43		
15,000	300	25	300	28	39,000	300	47		
16,000	330	28	300	28	40,000	290	67		
17,000	3 <b>3</b> 0	30			41,000	290	5 <b>5</b>	G1 64 M	₩-
18,000	320	35	300	<b>3</b> 5	42,000	290	47		
19,000	320	32			43,000	290	47		
20,000	310	33	310	24	44,000	290	47		
21,000	310	36			45,000	290	46		
22,000	320	36	310	31	46,000	290	46		
23,000	320	41			47,000	290	40		
24,000	320	45	310	31	48,000	280	39		
25,000	310	35	310	33	49,000	280	39		
26,000	330	41	310	46	50,000	280	39		

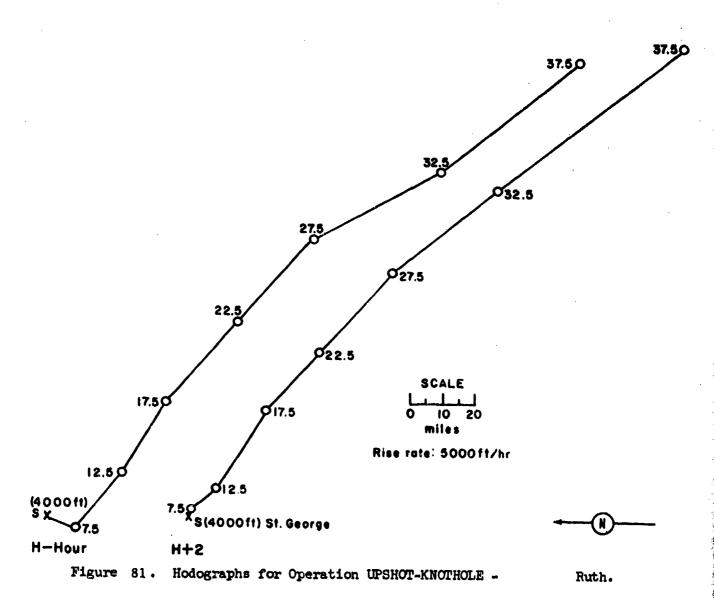
### NOTES:

1. Tropopa se height was 35,500 ft MSL at H-hour.

H+2 hours wind data was obtained from the pibal observation at St. George.

3. At H-hour the pressure at ground zero was 873 mb, the temperature 4.4°C, the dew point - 5.3°C and the relative humidity 48%.

<sup>2.</sup> H-hour surface wind data was obtained at the Control Point. H-hour upper air data was obtained from the rawinsonde section located on Yucca Lake. H+2 hours wind data was obtained from the pibal observation at St. George.



Dixie

PST CMT 6 Apr 1953 6 Apr 1953

TIME: 0730 1530 Sponsor: LASL

SITE:

NTS - Area 7 - 3 37° 05' 05" N 116° 01' 05" W

Site elevation: 4,025 ft

TOTAL YIELD: 11 kt

HEIGHT OF BURST: 6,022 ft

TYPE OF BURST AND PLACEMENT: Air burst over Nevada soil

CLOUD TOP HEIGHT: 45,000 ft MSL CLOUD BOTTOM HEIGHT: 33,000 ft MSL

FIREBALL DATA:

Time to 1st minimum: 10.5 to 11.2 msec

Time to 2nd maximum: 114 to 127 msec

Radius at 2nd maximum: NM

CRATER DATA: No crater

# REMARKS:

The highest reading at ground zero was 1.5 mr/hr at H+1 hour.

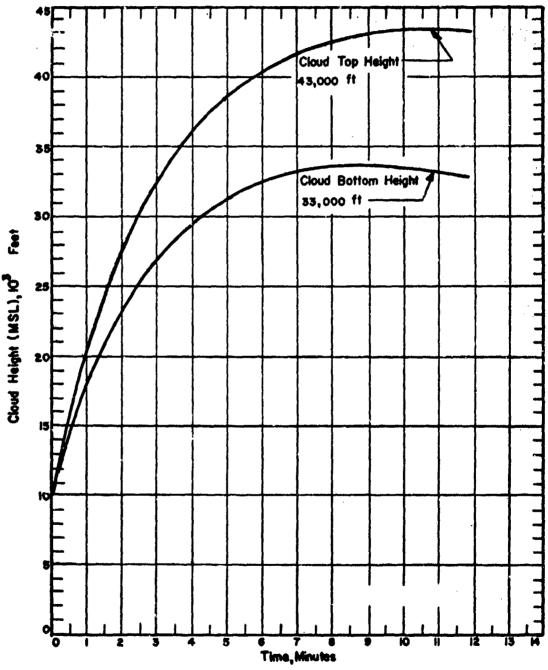


Figure 82. Cloud Dimensions: Operation UPSHOT-KNOTHOLE -

Dixie.

TABLE 25 NEVADA WIND DATA FOR OPERATION UPSHOT-KNOTHOLE -

Alt	H-hour		Alt	H-hou	r
(MSL)	Dir	Speed	(MSL)	Dir	Speed
feet	degrees	ingo h.	feet	degrees	mph
Surface	015	80	27,000	290	. 69
5,000	030	02	28,000	290	95
6,000	300	03	29,000	290	108
7,000	310	12	30,000	290	106
8,000	310	15	31,000	290	111
9,000	280	24	32,000	290	122
10,000	280	32	33,000	290	92
urst Height	280	33	34,000	290	82
11,000	280	36	35,000	290	78
12,000	280	38	36,000	290	74
13,000	280	52	37,000	290	84
14,000	280	55	38,000	290	145
15,000	<b>28</b> 0	36	39,000	290	138
16,000	280	39	40,000	290	140
17,000	280	42	41,000	<b>29</b> 0	140
18,000	290	73	42,000	290	138
19,000	290	83	43,000	290	131
20,000	290	83	44,000	290	141
21,000	290	90	45,000	290	137
22,000	290	92	46,000	290	119
23,000	290	84	47,000	290	102
24,000	290	84	48,000	290	93
25,000	290	78	49,000	290	90
26,000	290	65	50,000	290	90

- 1. Tropopause height was 38,500 ft MSL at H-hour.
- 2. Surface wind data was obtained at the Control Point.
  Upper air data was obtained from the rawinsonde section located on Yucca Lake.
- 3. At H-hour the pressure at ground zero was 861 mb, the temperature 15.5°C, the dew point -4.1°C and the relative humidity 25%.

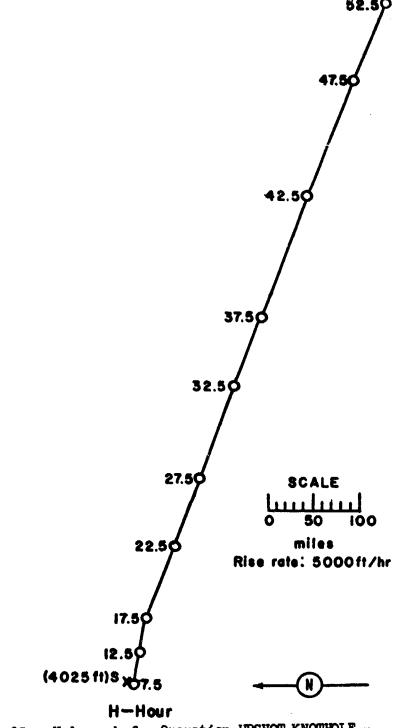


Figure 83. Hodograph for Operation UPSHOT-KNOTHOLE -

Dixie

Ray

11 Apr 1953 11 Apr 1953 0445 1245 TIME:

Sponsor: UCRL

TOTAL YIELD: 0.2 kt

NTS - Area 4a 37° 05' 56" N 116° 05' 33" W

Site elevation: 4,026 ft

FIREBALL DATA:

18.2 msec

HEIGHT OF BURST: 100 ft

Time to 1s+ minimum: 162 msec Time to 2114 maximum: Radius at 2nd maximum: NM

TYPE OF BURST AND PLACEMENT: Tower burst over Nevada soil

CLOUD TOP HEIGHT: 12,800 ft MSL CLOUD BOTTOM HEIGHT: 7,700 ft MSL

CRATER DATA: No crater

## REMARKS:

lout pattern is based upon readings taken at H+13 hours The on-site by radiological rurvey teams. The off-site fallout pattern was drawn from D-day read is of mobile ground-survey teams of the Radiological Safety organization. The t-1.2 decay approximation was used to extrapolate the dose rates to H+1 hour. This shot is sometimes designated as UPSHOT-KNOTHOLE-6.

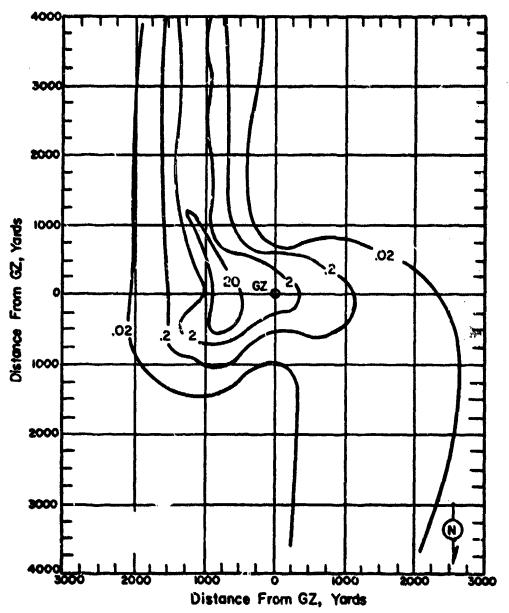


Figure 84. Operation UPSHOT-KNOTHOLE - Ray.
On-site dose rate contours in r/hr at H+1 hour.

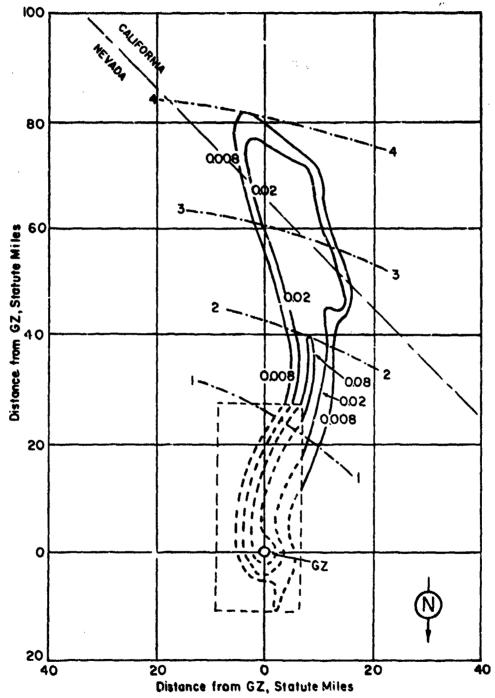


Figure 85. Operation UPSHOT-KNOTHOLE - Ray.
Off-site dose rate contours in r/hr at H+l hour.

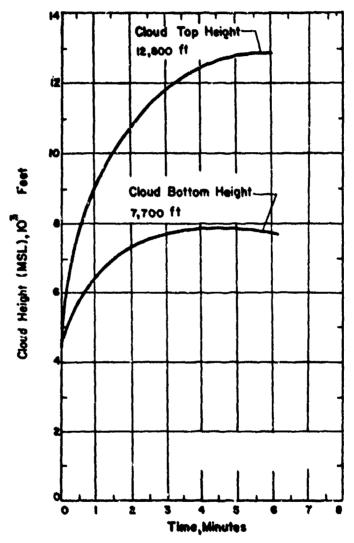


Figure 86. Cloud Dimensions: Operation UPSHOT-KNOTHOLE -

Ray.

TABLE 26 WIND DATA FOR OPERATION UPSHOT-KNOTHOLE-

RAY

	Test		Beatty,			Test S		Beatty,	Nev.
Alt	H-ho	ur	H+2 hc	urs	Alt	H-ho	ur	H+2 ho	urs
(MSL)	Dir	Speed	Dir	Speed	(MSL)	Dir	Speed	Dir	Sper
feet	degrees	mph	degrees	mbp	feet	degrees	mbp	degrees	mp):
Surface	045	06	010	15	27,000	290	155		
Burst Height	030	80			28,000	290	173		
5,000	010	17	360	16	29,000	290	207		
6,000	360	21	360	55	30,000	260	212		••
7,000	360	26	360	25	31,000	280	158		
8,000	360	36	360	23	32,000	280	135	~~-	
9,000	360	41	350	21	33,000	290	132		
10,000	360	36	340	20	34,000	290	138		•••
11,000	360	26			35,000	280	154		~~
12,000	360	26	330	18	36,000	270	166		
13,000	350	30			37,000	270	175		•-
14,000	350	26	330	24	38,000	270	161		
15,000	310	32	320	29	39,000	260	153		
16,000	300	38	330	35	40,000	260	159		
17,000	300	56			41,000	260	155		
18,000	300	56	310	46	42,000	250	133	~~-	
19,000	300	53			43,000	270	121		
20,000	300	51	300	63	44,000	270	115		
21,000	300	72			45,000	260	132	***	
22,000	300	95	300	92	46,000	280	170		~-
23,000	300	109			47,000	280	195		~
24,000	300	122			48,000	280	515		~-
25,000	300	129	290	112	49,000	280	224		
26,000	290	139	290	112	50,000	280	234		-

- 1. Tropopause height was 38,330 ft MSL at H-hour.
- 2. H-hour surface wind da a was obtained at the Control Point. H-hour upper air data was obtained from the rawinsonde section located on Yucca Lake. H+2 hour wind data was obtained from the pibal observation at Beatty.
- 3. At H-hour the pressure at ground zero was 869 mb, the temperature -0.3°C, the dew point -11.3°C, and the relative humidity 43%.

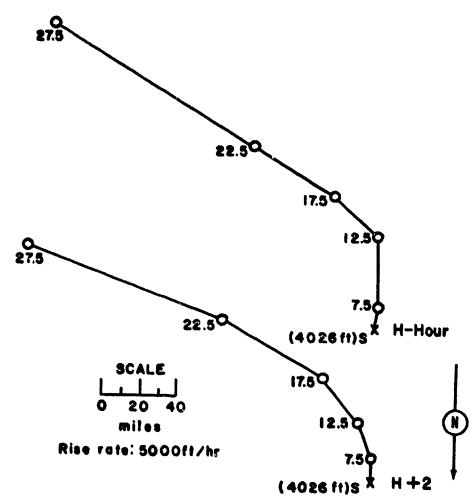


Figure 87. Hodographs for Operation UPSHOT-KNOTHOLE -

Ray.

## Badger

PST GMT

DATE: 18 Apr 1953 18 Apr 1953

TIME: 0435 1235

Sponsor: LASL

TOTAL YIELD: 23 kt

SITE: NTS - Area 2

37° 08' 18" N

116° 07' C4" W

Site elevation: 4,491 ft

HEIGHT OF BURST: 300 ft

TYPE OF BURST AND PLACEMENT:
Tower burst over Nevada soil

FIREBALL DATA:

Time to 1st minimum: 5.6 to 17.75 msec

Time to 2nd maximum: NM Radius at 2nd maximum: NM

CLOUD TOP HEIGHT: 36,000 ft MSL CLOUD BOTTOM HEIGHT: 23,000 ft MC

CRATER DATA: No crater

## REMARKS:

The on-site fallout pattern is based upon readings made on D-day and D+1 day by radiological survey teams. Because of heavy contamination, the highway on the main access road to the shot area could not be used, and, therefore, it was difficult to pinpoint the exact location of the readings. The off-site fallout pattern was drawn from D-day readings of mobile ground survey teams of the Radiological Safety organization. The  $t^{-1\cdot 2}$  decay approximation was used to extrapolate the dose rates to H+1 hour. This shot is sometimes designated as UPSHOT-KNOTHOLE-5.

## Badger

PST GMT

DATE: 18 Apr 1953 18 Apr 1953

TIME: 0435 1235

Sponsor: LASL

TOTAL YIELD: 23 kt

SITE: NTS - Area 2 37° 08' 18" N 116° 07' 04" W Site elevation: 4,491 ft

HEIGHT OF BURST: 300 ft

FIREBALL DATA:
Time to 1st minimum: 5.6 to 17.75 msec

Time to 2nd maximum: NM Radius at 2nd maximum: NM

TYPE OF BURST AND PLACEMENT:
Tower burst over Nevada soil

CLOUD TOP HEIGHT: 36,000 ft MSL CLOUD BOTTOM HEIGHT: 23,000 ft MC

CRATER DATA: No crater

## REMARKS:

The on-site fallout pattern is based upon readings made on D-day and D+1 day by radiological survey teams. Because of heavy contamination, the highway on the main access road to the shot area could not be used, and, therefore, it was difficult to pinpoint the exact location of the readings. The off-site fallout pattern was drawn from D-day readings of mobile ground survey teams of the Radiological Safety organization. The  $t^{-1.2}$  decay approximation was used to extrapolate the dose rates to H+1 hour. This shot is sometimes designated as UPSHOT-KNOTHOLE-5.

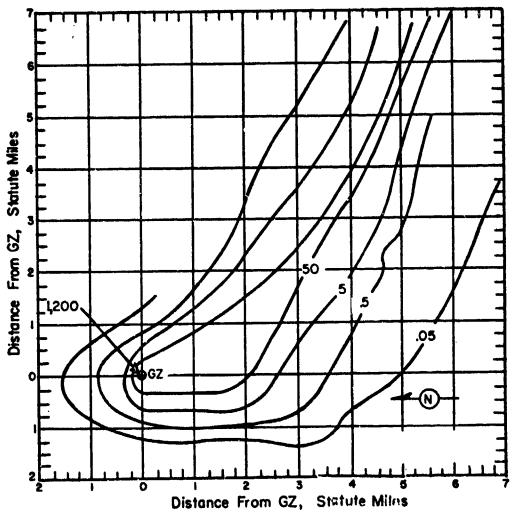


Figure 88. Operation UPSHOT-KNOTHOLE - Badger. On-site dose rate contours in r/hr at H+l hour.

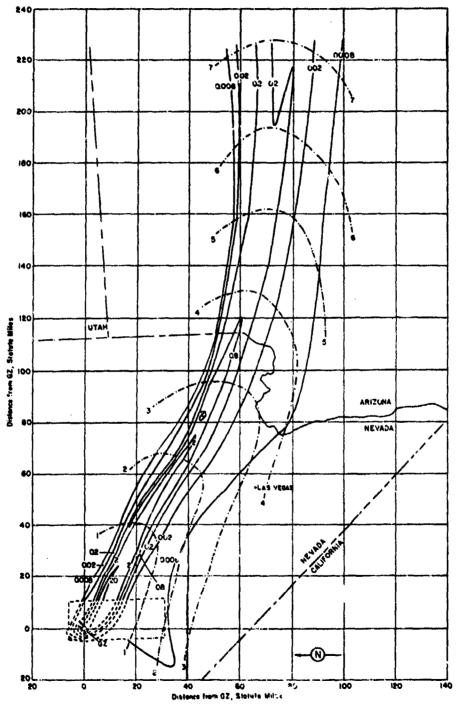


Figure 89. Operation UPSHOT-KNOTHOLE - Badger.
Off-site dose rate contours in r/hr at H+l hour.

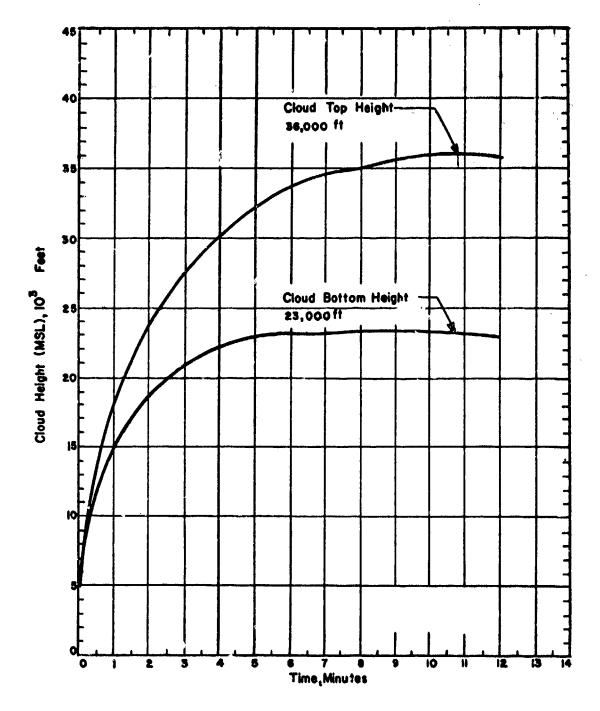


Figure 90 . Cloud Dimensions: Operation UPSHOT-KNOTHOLE -

Badger.

Altitude	H-hou	r	Altitude	H-hou	r
(MSL)	Dir	Speed	(MSL)	Dir	Speed
feet	degrees	mph	feet	degrees	mph
Surface	360	ìo	27,000	300	46
Burst Height	360	14	28,000	300	49
5,000	010	23	29,000	310	46
6,000	01.0	- 28	30,000	310	53
7,000	360	22	31,000	300	67
8,000	290	07	32,000	300	69
9,000	270	10	33,000	300	65
10,000	270	20	34,000	300	57
11,000	270	26	35,000	300	62
12,000	280	30	36,000	300	56
13,000	300	33	37,000	290	49
14,000	310	35	38,000	290	54
15,000	320	35	39,000	300	69
16,000	310	35	40,000	300	78
17,000	310	36	41,000	300	90
18,000	300	38	42,000	300	78
19,000	290	40	43,000	290	49
20,000	290	40	44,000	280	51
21,000	290	41	45,000	280	60
22,000	290	49	46,000	280	89
23,000	290	57	47,000	280	70
24,000	290	57	48,000	280	78
25,000	290	49	49,000	290	24
26,000	300	49	50,000	290	20

- Tropopause height was 39,320 ft MSL at H-hour. Surface wind data was obtained at the Control Point. Upper air data was obtained from the rawinsonde section located on Yucca Lake.
- 3. At H-hour the pressure at ground zero was 862 mb. the temperature 7.7°C, the dew point -3.9°C, and the relative humidity 40 %.

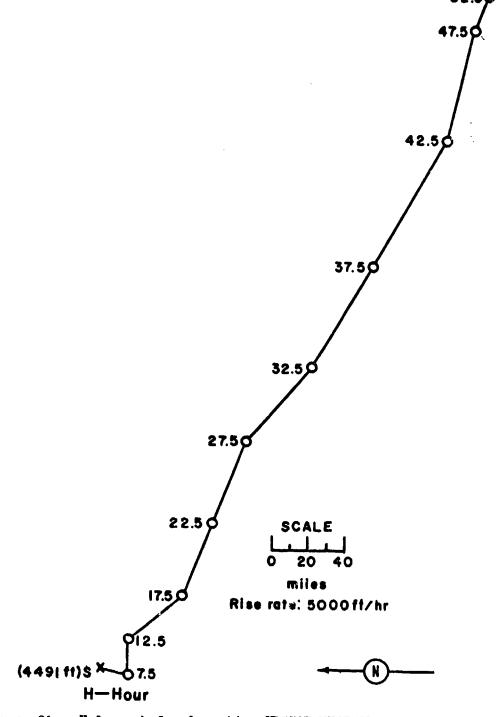


Figure 91. Hodograph for Operation UPSHOT-KNOTHOLE -

Badger.

Simon

**GMT** PST

25 Apr 1953 25 Apr 1953 DATE:

1230 TIME: 0430

SITE: NTS - Area 1 37° 03' 11"

Sponsor: LASL

116° 06' 10" W

Site elevation: 4,239 ft

TOTAL YIELD: 43 kt

300 ft HEIGHT OF BUPST:

FIREBALL DATA:

18.8 to 23.25 msec Time to 1st minimum:

Time to 2nd maximum: 176 msec

Radius at 2nd maximum: NM

CLOUD TOP HEIGHT: 44,000 ft MSL CLOUD BOTTOM HEIGHT: 31,000 ft MSI

No crater CRATER DATA:

TYPE OF BURST AND PLACEMENT: Tower burst over Nevada soil

## REMARKS:

The on-site fallout pattern is based upon readings obtained at H+91 hours by radiological survey teams. The off-site fallout pattern was drawn from D-day readings of motile ground-survey teams of the Radiological Safety organization. The changes in the anticipated fallout pattern necessitated movement of mobile personnel and equipment. This caused difficulties in pinpointing the exact location of the readings. The t-1.2 decay approximation was used to extrapolate the dose rates to H+1 hour for both the on-site and off-site patterns.

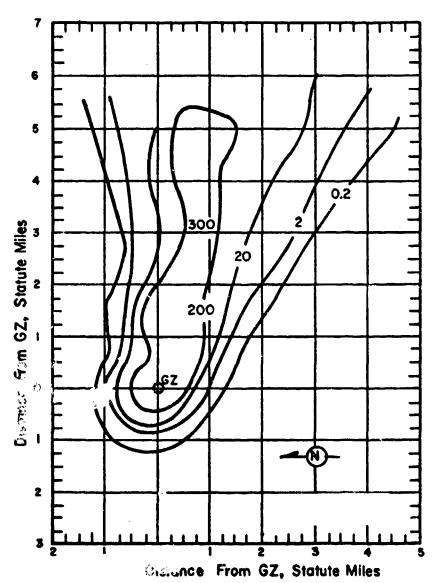


Figure 92. Operation UPSHOT-KNOTHOLE - Simon. On-site dose rate contours in r/hr at H+l hour.

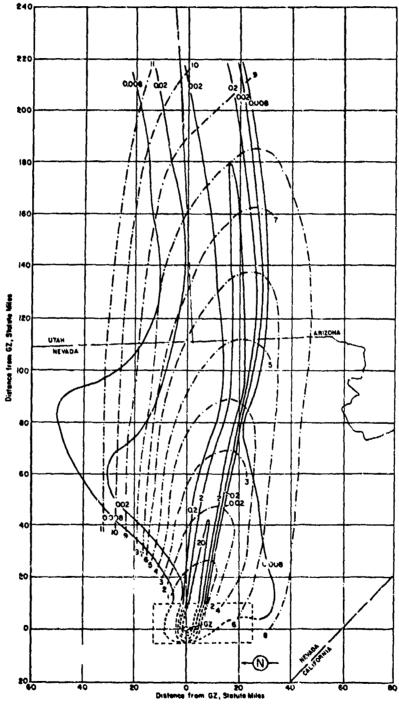


Figure 93. Operation UPSHOT-KNOTHOLE - Simon Off-site dose rate contours in r/hr at H+l hour.

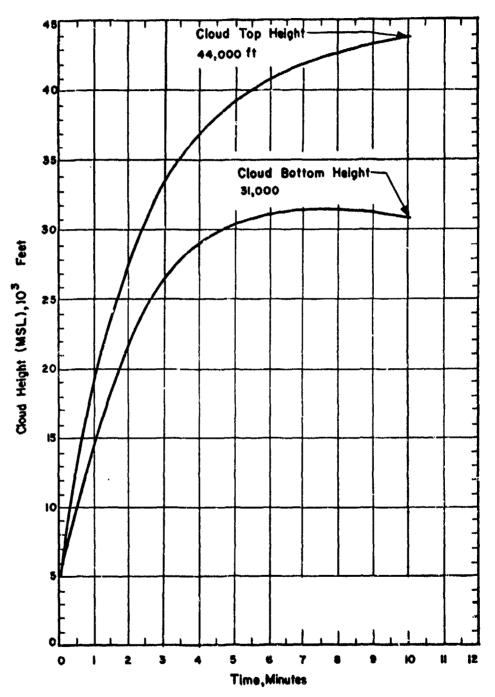


Figure 94. Cloud Dimensions: Operation UPSHOT-KNOTHOLE -

Simon.

TABLE 28 WIND DATA FOR OPERATION UPSHOT-KNOTHOLE -

SIMON

Altitude	H-hour		Altitude	H-hou	ır
(MSL)	Dir	Speed	(MSL)	Dir	Speed
feet	degrees	mph	feet	degrees	mbp
Surface	340	06	28,000	280	36
Burst Height	040	80	29,000	270	35
5,000	010	09	30,000	280	47
6,000	030	09	31,000	280	46
7,000	040	05	32,000	280	45
8,000	070	03	33,000	580	48
9,000	180	05	34,000	280	46
10,000	200	10	35,000	280	41
11,000	270	13	36,000	270	45
12,000	280	14	37,000	270	47
13,000	270	17	38,000	270	119
14,000	270	13	39,000	270	48
15,000	290	10	40,000	270	<b>5</b> 5
16,000	280	09	41,000	270	57
17,000	270	10	42,000	270	
1.8,000	270	30	43,000	270	55 48
19,000	280	14	44,000	270	30
20,000	280	30	45,000	270	35
21,000	280	35	46,000	270	28
22,000	280	26	47,000	270	25
23,000	280	29	48,000	270	25
24,000	280	25	49,000	270	25
25,000	28 <b>0</b>	24	50,000	270	28
26,000	280	26	54,000		= 0
27,000	280	33	- •		

- 1. Tropopause height was 39,350 ft MSL at H-hour.
- 2. H-hour surface wind data was obtained at the Control Point. H-hour upper air data was obtained from the rawinsonde section located on Yucca Lake.
- 3. At H-hour the pressure at ground zero was 870 mb, the temperature 11.7°C, the dew point -7.3°C and the relative humidity 26%.

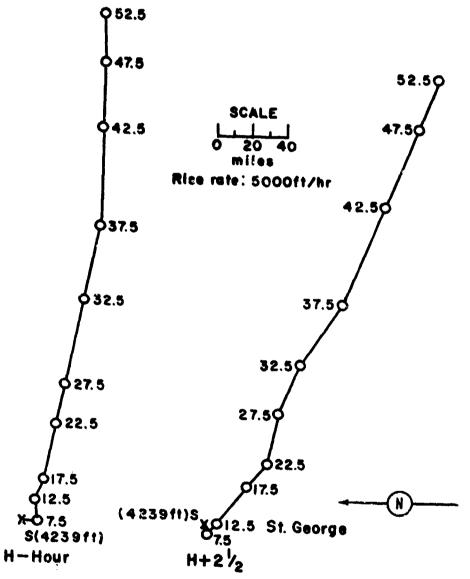


Figure 95. Hodographs for Operation UPSHOT-KNOTHOLE -

Simon.

Encore

PST GMT

DATE: 8 May 1953 8 May 1953

TIME: 0730 1530

SITE: NTS - Frenchman Flat

Sponsor: DOD-LASL

36° 30' 00" N 115° 55' 44" W Site elevation: 3,077 ft

TOTAL YIELD: 27 kt

HEIGHT OF BURST: 2,423 ft

FIREBALL DATA:

Time to 1st minimum: 16.8 to 17.8 msec

CLOUD TOP HEIGHT: 42,000 ft MSL CLOUD BOTTOM HEIGHT: 28,000 ft MSL

Time to 2nd maximum: 150 to 179 msec

CRATER DATA: No crater

Radius at 2nd maximum: 623.2

TYPE OF BURST AND PLACEMENT:
Air burst over Nevada soil

#### REMARKS:

This shot is sometimes designated as UPSHOT-KNOTHOLE - 9. There was no local fallout. The induced-activity pattern was constructed from readings taken at  $H+\frac{1}{2}$  hour and extrapolated to H+1 bour, using the generalized field dose rate decay curve for Nevada soil

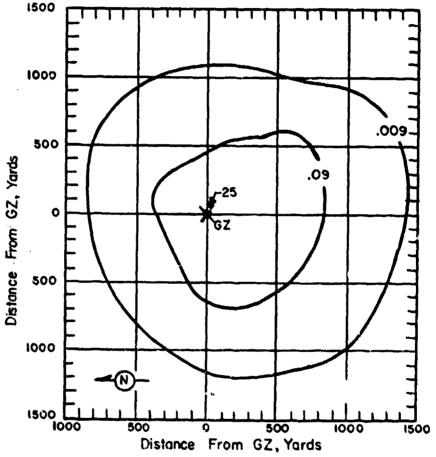


Figure 96. Operation UPSHOT-KNOTHOLE - Encore. On-site dose rate contours in r/hr at H+1 hour.

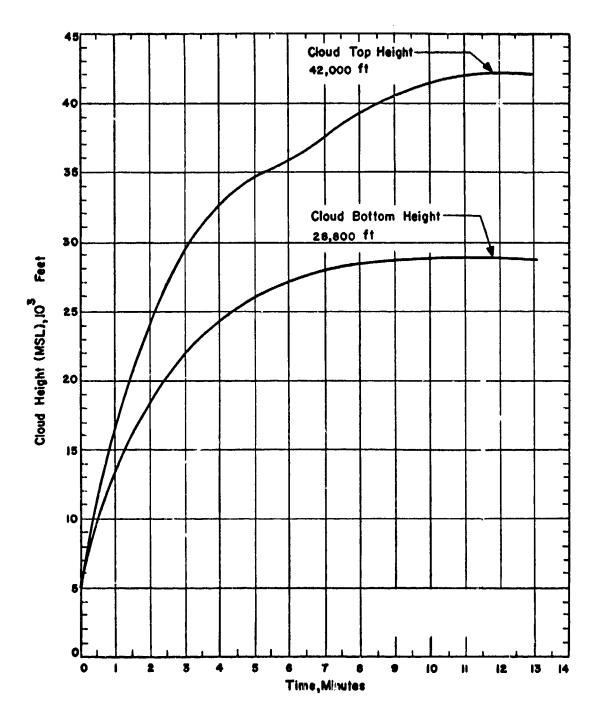


Figure 97. Cloud Dimensions:

Operation UPSHOT-KNOTHOLE -

Encore.

TABLE 29 NEVADA WIND DATA FOR OPERATION UPSHOT-KNOTHOLE -

ENCORE

Altitude	H-hour		Altitude	H-hour	
(MSL)	Dir	Speed	(MSL)	Dir	Speed
feet	degrees	mph	feet	degrees	mph
Surface	190	06	23,000	250	71
Burst Height	250	06	24,000	250	78
5,000	230	07	25,000	250	90
6,000	270	06	26,000	250	<del>9</del> 0
7,000	310	12	27,000	250	95
8,000	320	12	28,000	250	115
9,000	300	12	29,000	250	125
10,000	260	14	30,000	240	٦ 18
11,000	250	23	31,000	240	115
12,000	250	30	32,000	240	117
13,000	260	35	33,000	240	128
14,000	260	40	34,000	240	146
15,000	260	50	35,000	240	195
16,000	250	55	36,000	240	193
17,000	250	61	37,000	240	165
18,000	250	66	38,000	240	160
19,000	250	64	39,000	240	163
20,000	250	65	40,000	240	168
21,000	250	58	1,000	240	173
22,000	250	59	•		, 5

- 1. Tropopause height was 39,000 ft MSL at H-hour.
- 2. Surface wind data was obtained at the Control Point.
  Upper air data was obtained from the rawinsonde section located on Yucca Lake.
- 3. At H-hour the pressure at ground zero was 900 mb, the temperature 16.7°C, the dew point 7.0°C and the relative humidity 19%.

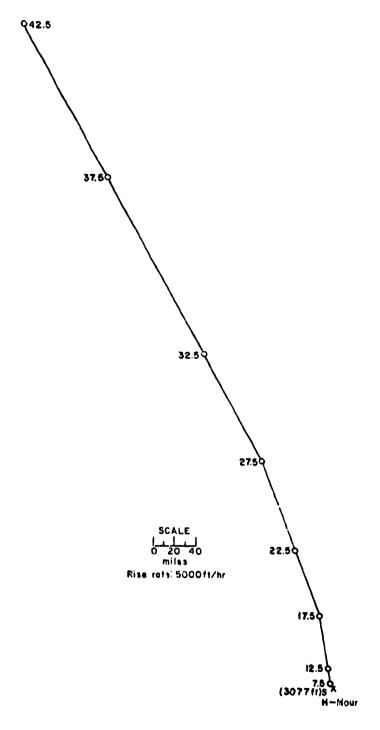


Figure 98. Hodograph for Operation UPSHOT-KNOTHOLE -

Encore.

Harry

PST GMT

DATE: 19 Muy 1953 19 May 1953

TIME: 0405 1205

SITE: NTS - Area 3a 37° 02' 25" N 116° 01' 31" W

Sponsor: LASL

Site elevation: 4,006 ft

TOTAL YIELD: 32 kt

HEIGHT OF BURST: 300 ft

FIREBALL DATA:

Time to 1st minimum: 16.8 to 19.2 msec

Time to 2nd maximum: 155 msec Radius at 2nd maximum: NM

TYPE OF BURST AND PLACEMENT:
Tower burst over Nevada soil

CLOUD TOP HEIGHT: 42,500 ft MSL CLOUD BOTTOM HEIGHT: 27,500 ft MSL

CRATER DATA: No crater

## REMARKS:

The on-site fallout pattern was obtained from readings at H+1 hour. No decay corrections were necessary. The off-site fallout pattern was drawn from D-day readings of mobile ground-survey teams of the Radiological Safety organization. This shot is sometimes designated as Upshot-Knothole-Shot 8.

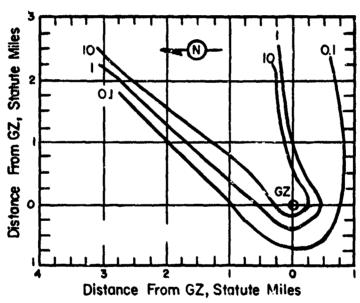


Figure 99. Operation UPSHOT-KNOTHOLE - Harry.
On-site dose rate contours in r/hr at H+l hour.

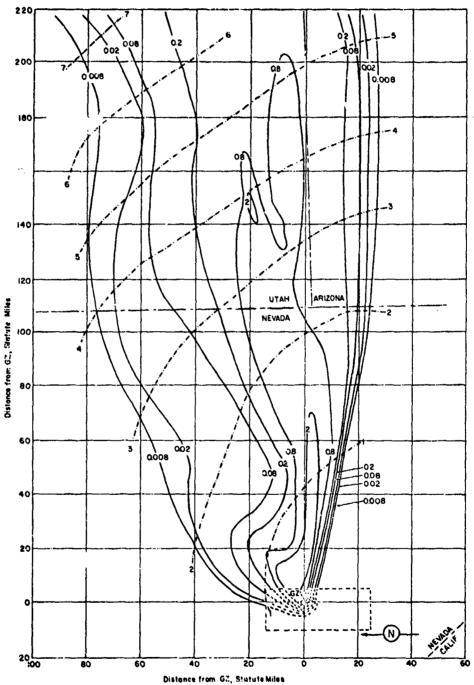


Figure 100. Operation UPSHOT-KNOTHOLE - Harry.
Off-site dose rate contours in r/hr at H+1 hour.

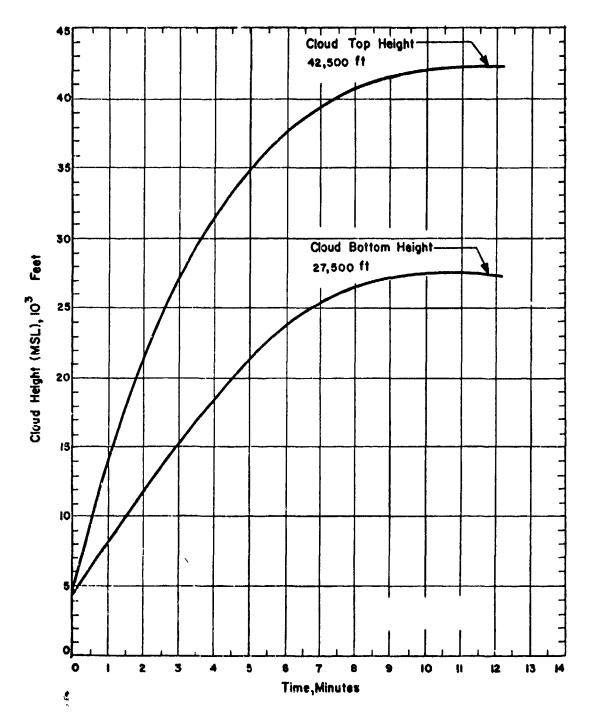


Figure 101. Cloud Dimensions: Operation UPSHOT-KNOTHOLE -

Harry.

TABLE 30 WIND DATA FOR OPERATION UPSHOT-KNOTHOLE -

HARRY

Altitude (MSL)	H-hour		Altitude	H-hour	
	Dir	Speed	(MSL)	Dir	Speed
feet	degrees	mplı	feet	degrees	mph
Surface	020	06	27,000	290	53
Burst Height	200	06	<b>28,0</b> 00	280	51
5,000	200	12	29,000	280	57
6,000	200	24	30,000	290	69
7,000	200	29	31,000	290	81
8,000	200	30	32,000	290	77
9,000	210	26	33,000	290	74
10,000	210	21	34,000	290	74
11,000	210	17	35,000	290	72
12,000	200	17	36,000	290	74
13,000	210	17	37,000	290	77
14,000	550	20	<b>38,0</b> 00	290	74
15,000	230	24	39,000	300	69
16,000	260	35	40,000	300	77
17,000	270	40	41,000	300	85
18,000	270	43	42,000	300	91
19,000	270	43	43,000	280	90
20,000	280	<b>ታ</b> ታ	44,000	280	87
21,000	280	48	45,000	280	89
22,000	280	55	46,000	280	86
23,000	280	57	47,000	280	87
24,000	280	63	48,000	280	92
25,000	280	62	49,000	280	84
26,000	290	57	50,000	280	72

- 1. Tropopause height was 40,500 ft MSL at H-hour.
- 2. H-hour surface wind data was obtained at the Control Point.
  H-hour upper air data was obtained from the rawinsonde section located on Yucca Lake. H+3 hour wind data was obtained from pibal observation at St. George.
- 3. At H-hour the pressure at ground zero was 874 mb, the temperature 14.3°C, the dew point -0.6°C, and the relative humidity 35%.

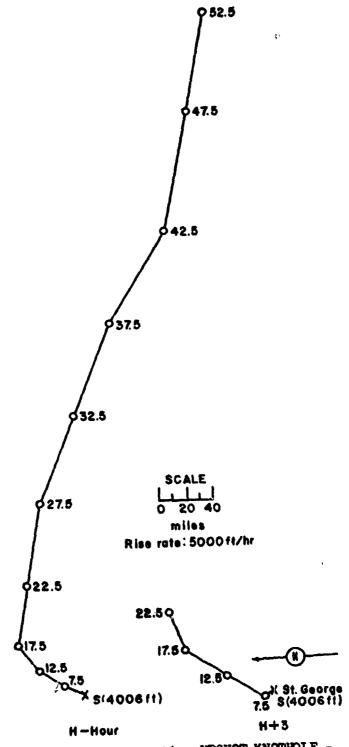


Figure 102. Hodographs for Operation UPSHOT-KNOTHOLE -

Harry.

Grable

PST TE: 25 May 1953 25

GMT May 1053

25 May 1953 1530

SITE: MTS - Frenchman Flat

Sponsor: IASL

36° 47' 35" N

TOTAL YIELD: 15 kt

0730

115° 54' 53" W Site elevation: 3,077 ft

HEIGHT OF BURST: 524 ft

over Nevada soil

TYPE OF BURST AND PLACEMENT:

Airburst of guntype weapon

FIREBALL DATA:

Time to 1st minimum: 13.3 to 14.9 msec Time to 2nd maximum: 122 to 138 msec

Radius at 2nd maximum: 557.6

CLOUD TOP HEIGHT: 35,000 ft MSL CLOUD BOTTOM HEIGHT: 23,000 ft MSL

CRATER DATA: No crater

#### REMARKS:

The on-site fallout pattern is due primarily to neutron induced activity and was obtained by the Radiological Safety organization from ground-survey measurements between  $H^{+\frac{1}{4}}$  hour and  $H^{+\frac{1}{4}}$  hours. No decay corrections were necessary. The off-site fallout pattern was drawn from D-day readings of mobile ground-survey teams of the Radiological Safety organization.

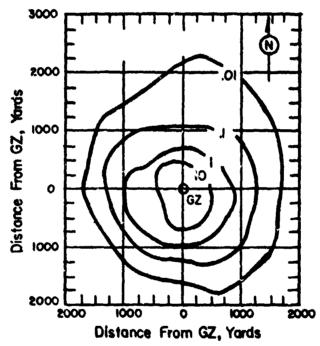


Figure 103. Operation UPSHOT-KNOTHOLE - Grable. On-site dose rate contours in r/hr at H+l hour.

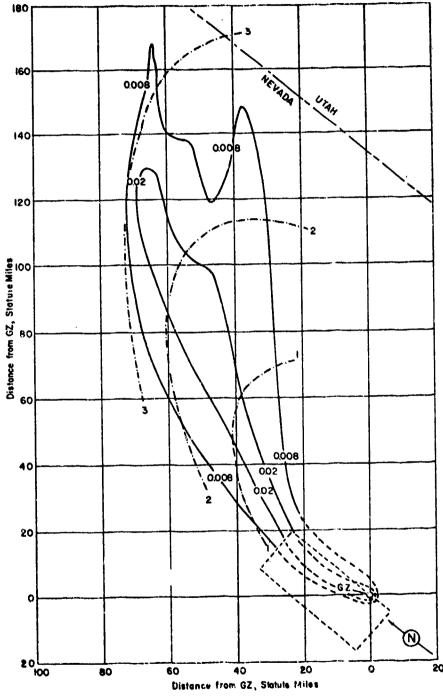


Figure 104. Operation UPSHOT-KNOWHOLE - Grable.
Off-site dose rate contours in r/hr at H+1 hour.

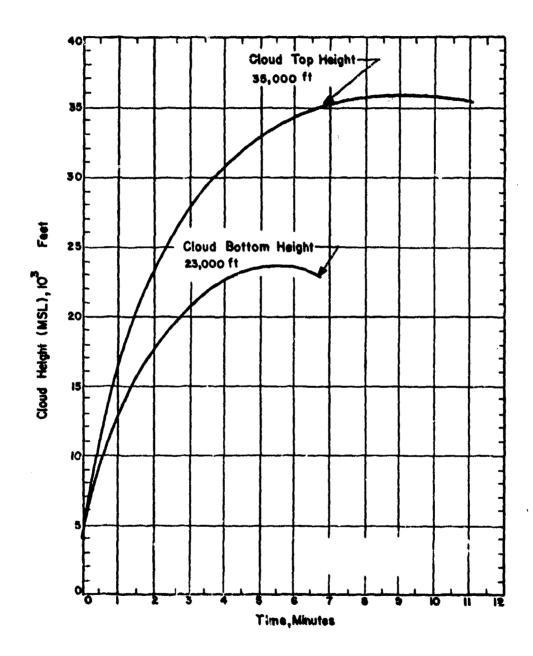


Figure 105. Cloud Dimensions: (neration UPSHOT-KNOTHOLE - Grable.

Altitude	H-hour		Altitude	Fahour	
(MSL)	Dir	Speed	(MSL)	Dir 🖟	Speed
feet	degrees	mph	fect	degrees	ntbji
Surface	360	05	27,000	220	105
Burst Height	220	08	28,000	220	102
4,000	250	12	29,000	<i>-₽</i> 20	92
5,000	550	16	30,000	550	98
6,000	190	24	31,000	220	124
7,000	180	35	32,000	<b>220</b>	126
8,000	190	24	33,000	550	125
9,000	190	24	34,000	220	120
10,000	200	35	35,000	220	138
11.000	200	35	36,000	550	ユミウ
12,000	200	36	37,000	220	:0
13,000	200	37	38,000	220	103
14,000	200	38	39,000	550	95
15,000	200	40	40,000	550	75
16,000	200	55	41,000	220	85
17,000	210	63	42,000	220	91
18,000	210	85	43,000	550	72
19,000	210	85	44,000	220	61
20,000	220	85	45,000	220	65
21,000	220	86	46,000	550	64
22,000	220	87	47,000	220	63
23,000	220	94	48,000	220	77
24,000	220	101	49,000	550	60
25,000	220	<b>7</b> 5	50,000	220	38
26,000	220	63	• • •		5.

- 1. Tropopause height was 35,400 ft MSL at H-hour.
- 2. Surface and lower level wind data was obtained at the Control Point. Upper air data was obtained from the rawinsonde section located on Yucca Lake.
- 3. At H-hour the pressure at ground zero was 901 mb, the temperature 14.8°C, the dew point -3.8°C and the relative humidity 32%.

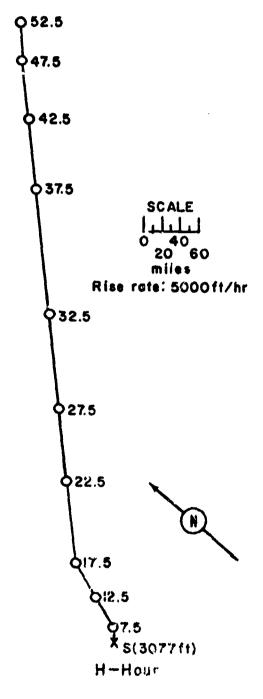


Figure 106. Hodograph for Operation UPSHOT-KNOTHOLE -

Grable

Climax

PST GMT

DATE: 4 Jun 1953 4 Jun 1953

Sponsor: LASL

TIME: 0315 1.115

SITE: NTS - Area 7 - 3 37° 05' 15" N 116° 01' 06" W

TOTAL YIELD: 61 kt

Site elevation: 4,025 ft

HEIGHT OF BURST: 1,334 ft

FIREBALL DATA:

Time to 1st minimum: 27.0 to 27.2 msec Time to 2nd maximum: 250 to 257 msec

Radius at 2nd maximum: 918.4 ft

TYPE OF BURST AND PLACEMENT:
Air burst over Nevada soil

CLOUD TOP HEIGHT: 42,700 ft MSL CLOUD BOTTOM HEIGHT: 35,000 ft MSL

CRATER DATA: No crater

## REMARKS:

The contamination was due primarily to neutron-induced activity. The on-site pattern was drawn from H+1-hour readings. No decay corrections were necessary. Little fallout was detected within the 200-mile zone. All downwind readings were only slightly above normal background.

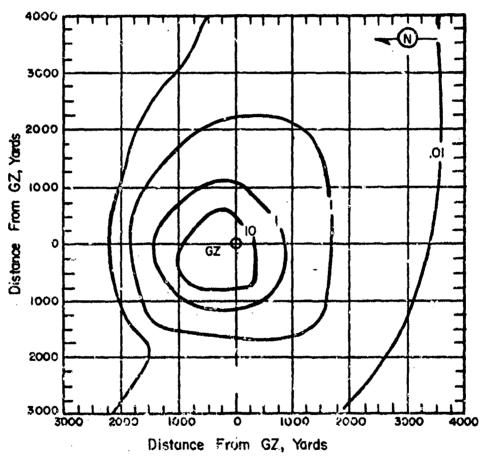


Figure 107. Operation UPSHOT-KNORHOLE - Climax. On-site dose rate contours in r/hr at H+1 hour.

TABLE 32 WIND DATA FOR OPERATION UPSHOT-KNOTHOLE-

CLIMAX

Altitude	H-hour		Altitude	Il-hour	
(MSL)	Dir	Speed	(MSI)	Dir	Speed
feet	degrees	mph	feet	degrees	mph
Surface	Q45	03	27,000	310	28
Burst Height	010	09	28,000	310	32
5,000	010	12	29,000	310	28
6 <b>,0</b> 00	360	07	30,000	310	38
7,000	010	09	31.,000	310	32
8,000	020	97	32,000	<b>31</b> 0	30
9,000	020	122	33 <b>,0</b> 00	300	28
10,000	140	03	34,000	280	23
11,000	550	05	35,000	270	50
12,000	200	03	36,000	260	18
13,000	190	07	37,000	250	22
14,000	170	09	38,000	260	24
15,000	170	07	39,000	280	25
16,000	210	05	40,000	250	28
1.7,000	250	12	41,000	250	26
18,000	270	1.7	42,000	240	32
19,000	270	18	43,000	260	28
20,000	280	15	44,000	270	18
21,000	28o	18	45,000	280	14
22,000	310	31	45,000	270	14
23,000	320	20	47,COO	270	23
24,000	310	23	48,000	270	25
25,000	310	22	49,000	270	21
26,000	310	28	50,000	270	13

- 1. Propopause height was 39,060 it MSL at H-hour.
- 2. H-hour surface and lower level wind data was obtained at the Control Point. H-hour upper air data was obtained from the rawinsonds section located on fucca Lake.
- 3. At H-hour the pressure at ground zero was 867 mb, the temperature 13.3°C, the dew point -3.9° and the relative humidity 30%.

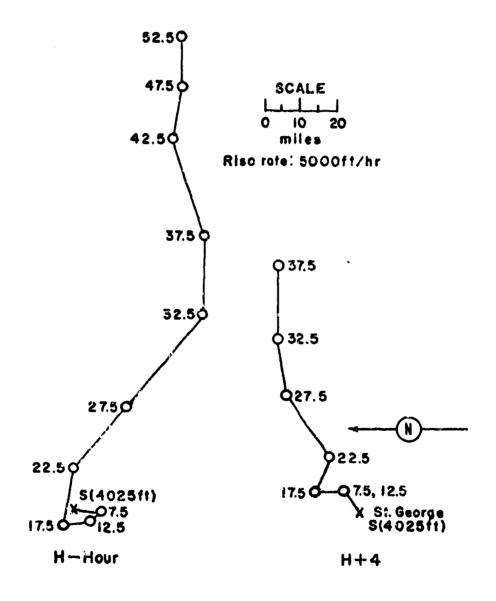
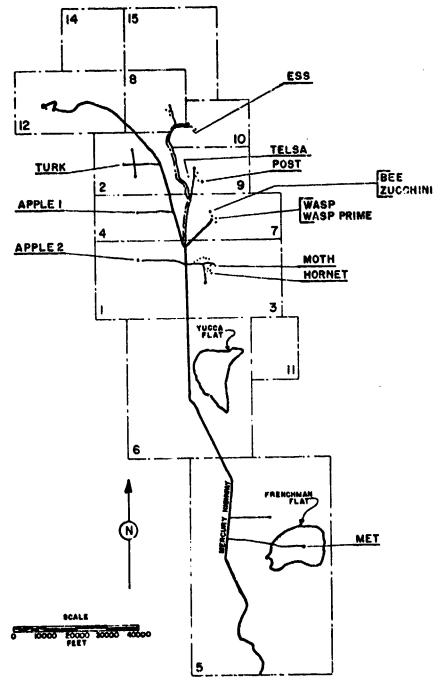


Figure 108. Modographs for Operation UPSHOT-KNOTHOLE - Climax.



NEVADA TEST SITE

Figure 109. Operation TEAPON, Shot Locations.

OPERATION TEAPOT -

Wasp

DATE: 18 Feb 1.955 18 Feb 1955

TIME: 1200 2000

GMT

37° 05' 12" N 116° 01' 19" W

Sponsor: LASL

HEIGHT OF BURST:

Site elevation: 4,195 ft

SITE: NIS - Area T-7-4

TOTAL YIELD: 1 kt

TYPE OF BURST AND PLACEMENT: Air burst over Nevada soil CLOUD TOP HEIGHT: 21,500 ft MSL CLOUD BOTTOM HEIGHT: 14,500 ft MSL

762 ft

FIREBALL DATA:

Time to 1st minimum: 3.3 to 4 msec Time to 2nd maximum: 44 to 48 msec Radius at 2nd maximum: 196.8 ft

CRATER DATA: No crater

## REMARKS:

The contours resulting from this shot were due primarily to neutroninduced activity. The on-site pattern was obtained from Rad-Safe readings at H+1 hour. No decay corrections were necessary. No off-site pattern is presented because of the low activity levels encountered.

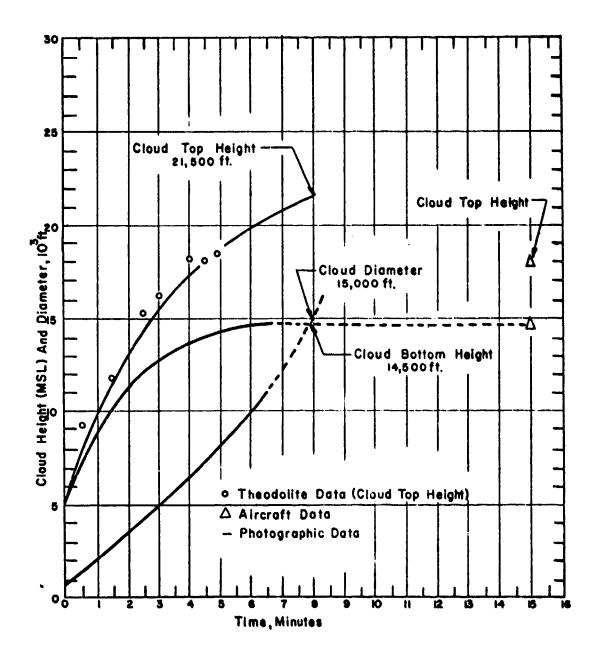


Figure 110. Operation TEAPOT - Wasp.
On-site dose rate contours in r/hr at H+1 hour.

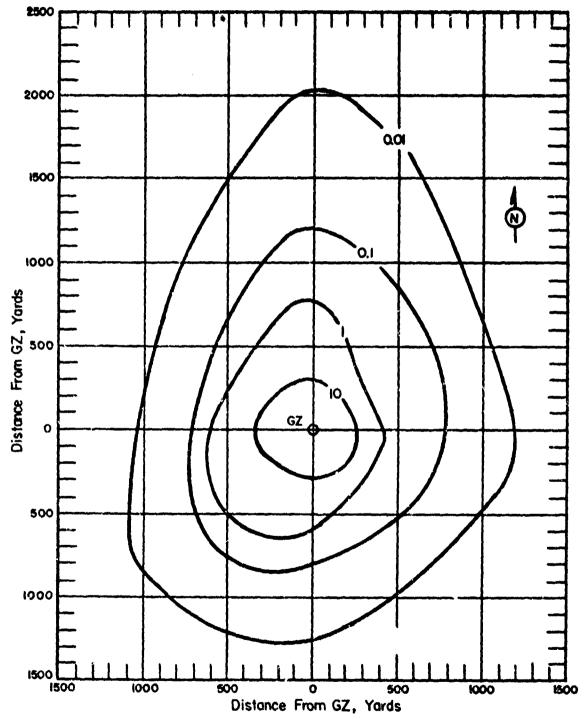


Figure 111. Cloud Dimensions: Operation TEAPOT -

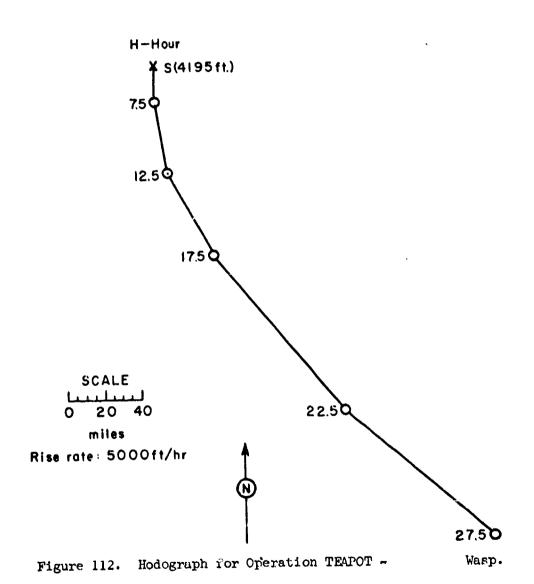
Wasp.

TABLE 33 NEVADA WIND DATA FOR OPERATION TEAPOT-

WASP

Altitude	ll-h	our
(MSL)	Dir	Speed
feet	degrees	այչի
Surface	330	56
5,000	360	29
6,000	010	23
7,000	360	5/1
8,000	330	29
9,000	330	35
1.0,000	<b>3</b> 50	39
12,000	340	145
14,000	330	49
15,000	<b>33</b> 0	51
16,000	330	50
18,000	320	76
20,000	320	110
23,000	310	104
25,000	310	107

- H-hour winds were estimated
   At shot height the temperature was -5.5°C, the pressure 846 mb.



OPERATION TEAPOR -

Moth

PST GMT

DATE: 22 Feb 1955 22 Feb 1955

TIME: 0545 1345

Sponsor: LASL

SITE: NTS - Area 3

37° 02' 52" N 116° 01' 16" W

Site elevation: 4,026 ft

TOTAL YIELD: 2 kt

HEIGHT OF BURGE: 300 ft

FIREBALL DATA:

Time to 1st minimum: 5.0 to 6.0 msec

Time to 2nd maximum: 68 to 80 msec Radius at 2nd maximum: 229.6 ft

TYPE OF BURST AND PLACEMENT:

Tower burst over Nevada soil

CLOUD TOP HEIGHT: 24,200 ft MSL CLOUD BOTTOM HEIGHT: 15,900 ft MSL

CRATER DATA: No crater

## REMARKS:

The on-site fallout pattern was constructed from data resulting from six different ground surveys performed by the Rad-Safe organization from  $H^{-\frac{1}{2}}$  hour to D+15 days. AN/PDR-39 instruments were used. Nine stake lines (approximately radial) along existing roads around ground zero aided the survey teams in locating their position. The off-site fallout pattern was drawn from ground-survey readings taken by the off-site Radiological Safety organization. The  $t^{-1.2}$  decay approximation was used to extrapolate the dose-rate readings to H+1 hour for both on-site and off-site patterns.

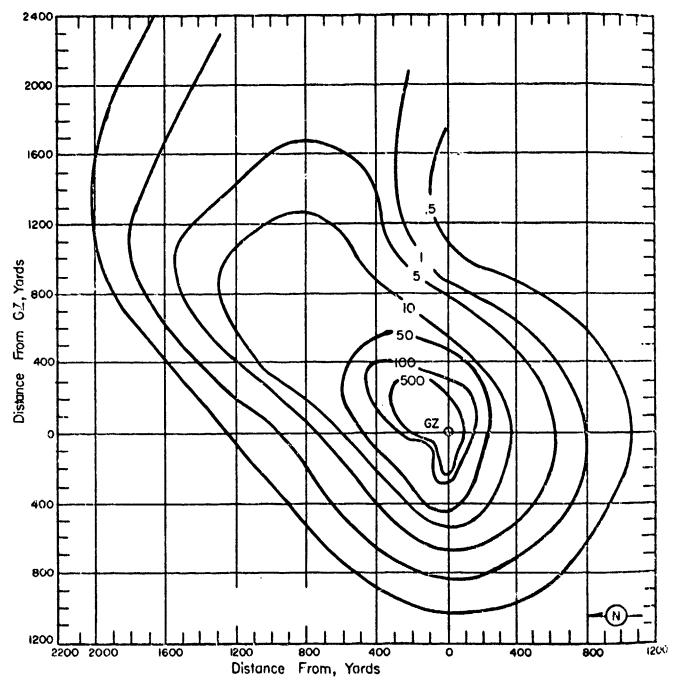


Figure 113. Operation TEAPOT - Moth.
On-site dose rate contours in r/hr at H+l hour.

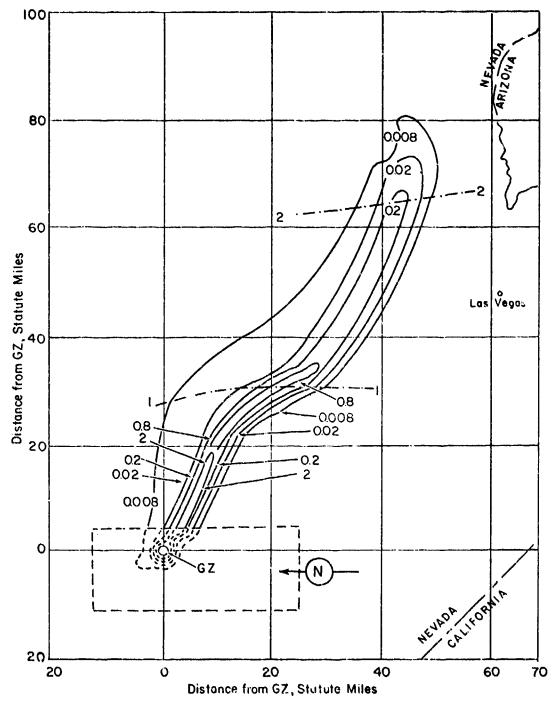


Figure 114. Coration TEAFOT - Moth.
Off-site dose rate contours in r/hr at H+1 hour.

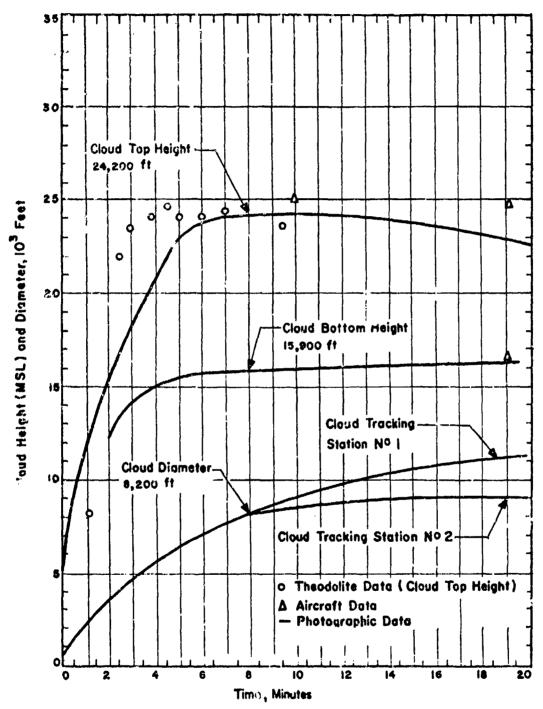


Figure 115. Cloud Dimensions: Operation TEAPOT - Moth. (Tracking Station No. 1 located 48 miles SE of C. P. and Tracking Station No. 2 located 50 miles SW of C.P.)

TABLE 34 NEVADA WIND DATA FOR OPERATION TEMPOR -

MOTH

Altitude	/ H-hour		Altitude	H-hour	
(MSL)	Dir	Speed	(MSL)	Dir	Speed
feet	degrees	mph	feet	degrees	mph
Surface	Calm	Calm	27,000	310	86
5,000	550	06	.89,000	310	88
6,000	230	12	29,000	310	90
7,000	260	18	30,000	310	83
8,000	290	20	31,000	300	78
9,000	310	29	32,000	300	82
10,000	31.0	36	33,000	31.0	86
11,000	310	38	311,000	310	91
12,000	310	37	35,000	3 1.0	91.
13,000	310	39	36 <b>,</b> 000	300	86
14,000	310	4C	37,000	300	82
15,000	300	45	38,000	300	77
16,000	300	48	39,000	300	63
17,000	300	52	40,000	300	6)+
18,000	300	56	41,000	300	61
19,000	300	63	42,000	290	63
20,000	300	62	43,000	290	67
21,000	300	63	114,000	300	68
22,000	300	69	45,000	300	67
23,000	300	69	46,000	300	66
24,000	310	75	47,000	300	60
25,000	310	71	48,000	300	51
26,000	310	77	49,000	300	43
		,	50,000	300	<sup>1</sup> 40

NOTE: At shot height the temperature was  $-3.9^{\circ}$ C and the pressure 871 mb.

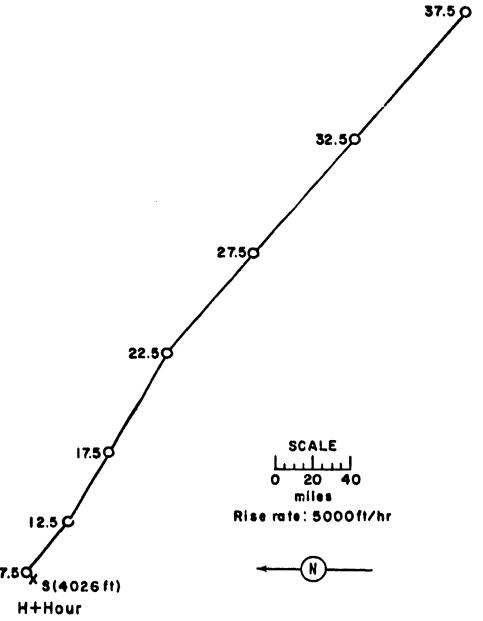


Figure 116. Hodograph for Operation TFAPOT -

Moth.

OPERATION TEAPOR -

Tesla

 DATE:
 1 Mar 1.955
 1 Mar 1.955

 TIME:
 0530
 1330

Sponsor: UCRL

SITE: NTS - Area 9b 37° 07' 32" N 116° 07' 51" W Site elevation: 4,021 ft

TOTAL YIELD: 7 kt

HEIGHT OF BUR-T: 300 ft

FIREBALL DATA:

Time to 1st minimum: 7.0 to 8.8 msec

Time to 2nd minimum: 85 msec Radius at 2nd maximum: 367.4 ft TYPE OF BURST AND PLACEMENT:
Tower burst over Nevada soil

CLOUD FOR HEIGHT: 30,000 ft MSL CLOUD BOTTOM HEIGHT: 18,300 ft MSL

CRATER DATA: No crater

## R!MARKS:

The on-site fallout pattern was constructed from data reculting from seven different ground surveys performed by the Radiological Safety organization from  $H^{-\frac{1}{2}}$  hour to D+64 days. AN/FDR-39 instruments were used. Eight radial stake lines along existing roads around ground zero aided the survey teams in locating their position. The off-site fallout pattern was drawn from ground-survey readings taken by the off-site radiological safety organization. The  $t^{-1.2}$  decay approximation was used to extrapolate the dose-rate readings to H+1 hour for both on-site and off-site patterns.

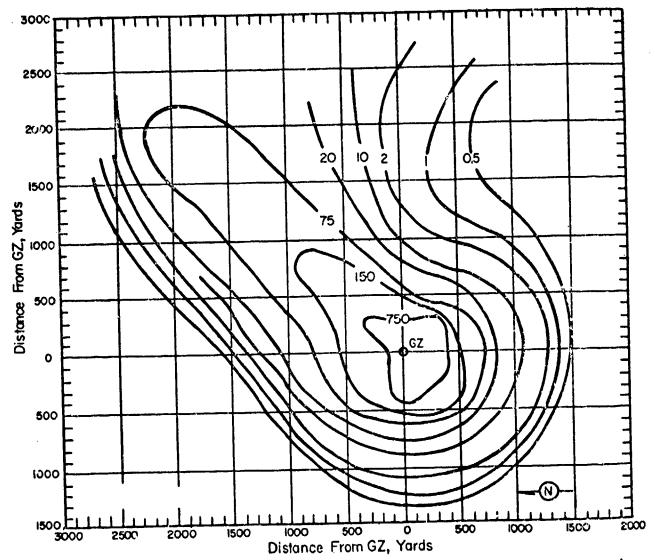


Figure 117. Operation TEAPOT - r/hr at H+l hour.

Tesla. On-site dose rate contours in

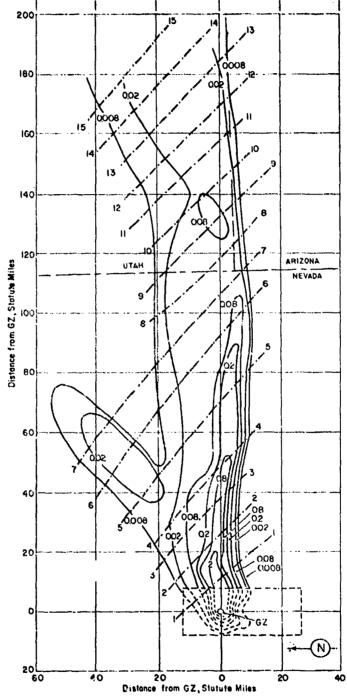


Figure 118. Operation TEAFOT - Tesla.
Off-site dosc rate contours in r/hr at H+1 hour.

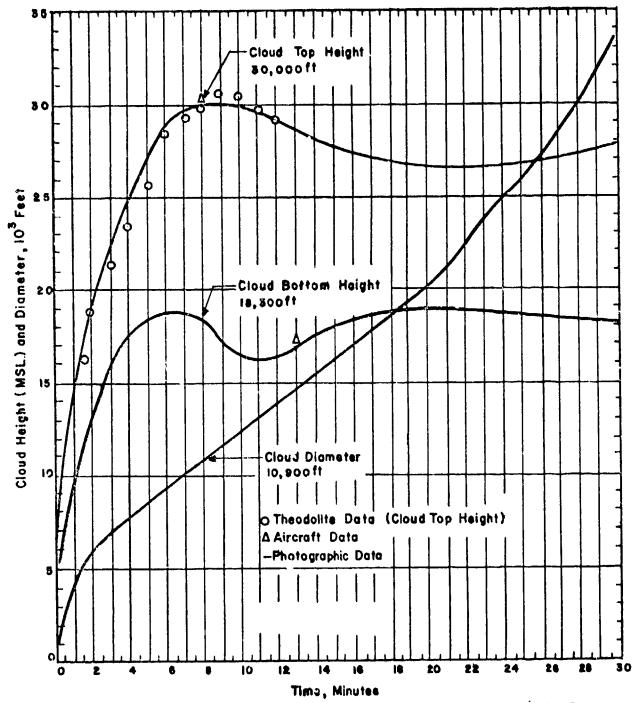


Figure 119. Cloud Dimensions: Operation TEAPOT -

Tesla.

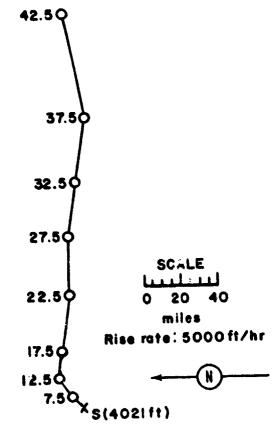
TABLE 35 NEVADA WIND DATA FOR OPERATION TEAPOT-

TESIA

Altitude	H-hour		Altitude:	H-hour	
(MSL)	Dir	Speed	(MSL)	Dir	Speed
feet	degrees	mph	feet	degrees	mph
Surface	Ca l.m	Calm	23,000	280	32
5,000	Calm	Calm	24,000	280	33
6,000	Calm	Calm	25,000	270	33
7,000	Calm	Calm	26,000	270	32
8,000	220	12	27,000	270	30
9,000	220	14	28,000	270	30
10,000	230	12	29,000	270	29
11,000	280	12	30,000	280	29
12,000	300	15	31,000	280	29
13,000	290	16	32,000	280	31
14,000	290	16	33,000	280	35
15,000	280	1.5	34,000	280	35
16,000	270	1.4	35,000	280	36
17,000	270	17	36,000	270	36
18,000	270	23	37,000	260	40
19,000	280	28	38,000	260	41
20,000	280	30	39,000	260	52
21,000	270	31	40,000	260	58
22,000	270	30	•		

# NOTES:

- Tropopause height was 38,000 ft MSL.
   At shot height the temperature was -0.50°C and the pressure 864 mb.



H-Hour

Figure 120. Hodograph for Operation TEAPOT -

Tesla.

OPERATION TEAPOR -

Turk

PST GMP

DATE: 7 Mar 1955 7 Mar 1955

TIME: 0520 1320

SITE: NTS - Area 2 37° 08' 18" N 116° 07' 03" W Site elevation: 4,491 ft

Sponsor: UCRL

TOTAL YIELD: 43 kt

HEIGHT OF BURST: 500 ft

TYPE OF BURST AND PLACEMENT:
Tower burst over Nevada soil

FIREBALL DATA:

Time to 1st minimum: 22 msec Time to 2nd maximum: 202 msec Radius at 2nd maximum: NM CLOUD TOP HEIGHT: 44,700 ft MSL CLOUD BOTTOM HEIGHT: 35,100 ft MSL

CRATER DATA: No crater

#### REMARKS:

The on-site fallout pattern was constructed from data resulting from eight different ground surveys performed by the Rad-Safe organization from  $H^{\pm}l^{\frac{1}{2}}$  hour to D+58 days. AN/PDR-39 instruments were used. Eight stake lines (approximately radial) along existing roads around ground zero aided the survey teams in locating their position. The off-site fallout pattern was drawn from ground survey realings taken by the off-site Radiological Safety organization. The  $t^{-1\cdot 2}$  decay approximation was used to extrapolate the dose-rate readings to H+1 hour for both on-site and off-site patterns. The portion of the pattern East of the test site is primarily residual contamination from Teapot Shots 2 and 3.

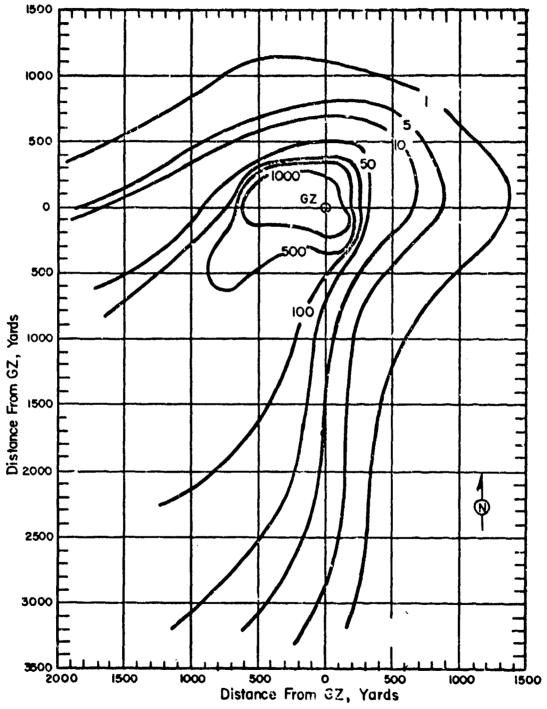


Figure 121. Operation TEAPOT - Turk.
On-site dose rate contours in r/hr at H+l hour.

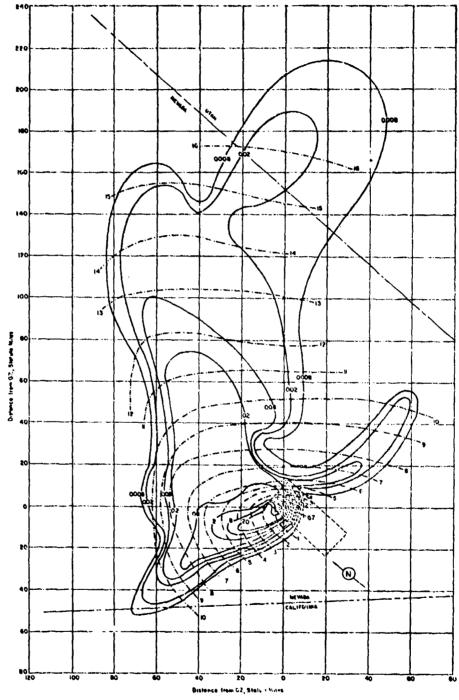


Figure 122. Operation TEAPOT - Turk.
Off-site dose rate contours in r/hr at H+1 hour.

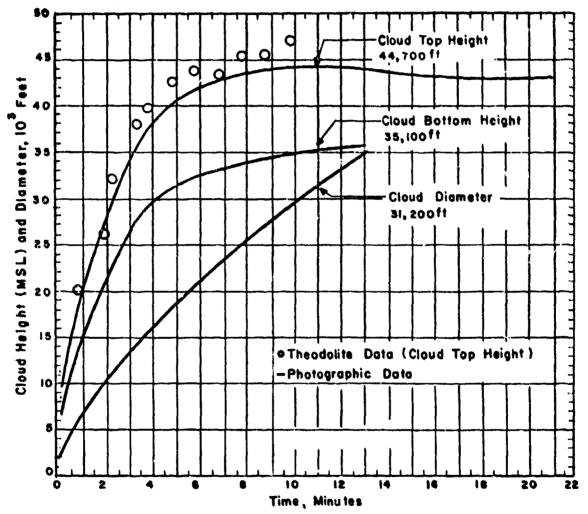


Figure 123. Cloud Dimensions: Operation TEAPOT -

Turk.

TABLE 36 NEVADA WIND DATA FOR OPERATION TEAPOR-

TUNK

Altitude	H-ho	ur.	Altitude	H-hou	11.
(MSL)	Dir	Speed	(MSI)	Dir	Speed
feet	degrees	шћу	feet	degrees	mph
Surface	310	12	27,000	110	10
5,000	010	22	28,000	130	10
6,000	030	Sjt	29,000	3.50	09
7,000	030	23	30,000	150	08
8,000	050	17	31,000	150	06
9,000	030	08	32,000	130	05
10,000	350	02	33,000	260 ·	07
11,000	310	03	34,000	260	10
12,000	130	05	35,000	260	13
13,000	140	06	36,000	270	12
14,000	130	08	37,000	580	12
15,000	140	07	38,000	290	12
16,000	090	06	39,000	270	29
17,000	070	70	40,000	2 <b>6</b> 0	18
18,000	070	09	41.,000		
19,000	050	15	42,000	Ca lm	Ca li
20,000	050	16	43,000		-
21,000	050	12	44,000	2,10	47
22,000	060	3.0	45,000	270	54
23,000	070	09	46,000	270	56
5/1,000	080	80	47,000	270	57
25,000	090	07	48,000	270	62
26,000	100	08	49,000	270	63
			50,000	270	61

## NOTES:

Tropopause height was 10,000 ft MSL at H-hour.
 At shot height the temperature was 5.6°C and the pressure 855 mb.

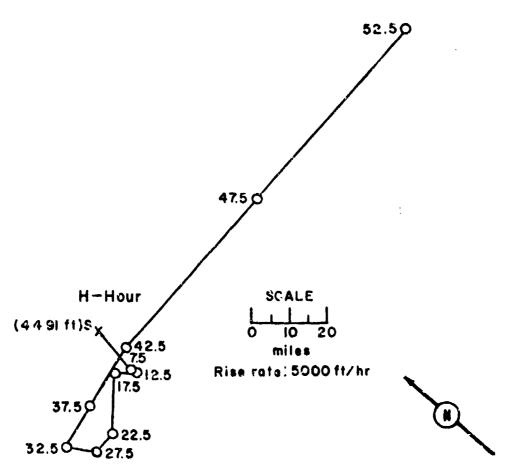


Figure 124. Hodograph for Operation TEAPOT -

Turk

OPERATION TEAPOT -

Hornet

12 Mar 1955 12 Mar 1955 Sponsor: LASL

DATE: TIME: 0520 1320

SITE: NTS - Area 3a 370 021 25" 116° 01' 31" W

Site elevation: 4,007 ft

TOTAL YIELD: 4 kt

HEIGHT OF BURST:

TYPE OF BURST AND PLACEMENT: Tower burst over Nevada soil

FIREBALL DATA:

Time to 1st minimum: 5.5 to 6.6 msec Time to 2nd maximum: 66 to 71 msec

Radius at 2nd maximum: NM

CLOUD TOP HEIGHT: 37,000 ft MSL CLOUD BOTTOM HEIGHT: 27,800 ft MSL

CRATER DATA: No crater

#### REMARKS:

The on-site fallcut pattern was constructed from data resulting from seven different ground surveys performed by the Rad-Safe organization from H+1 hour to D+53 days. AN/PDR-39 instruments were used. Eight stake lines (approximately radial) along existing roads around ground zero aided the survey teams in locating their position; many individual readings off the roads were also utilized in drawing the patterns for this shot.

The off-site fallout pattern was drawn from ground-survey readings taken by the off-site Radiological Safety organization. The t-1.2 decay approximation was used to extrapolate the doserate readings to H+1 hour for both on-site and off-site patterns.

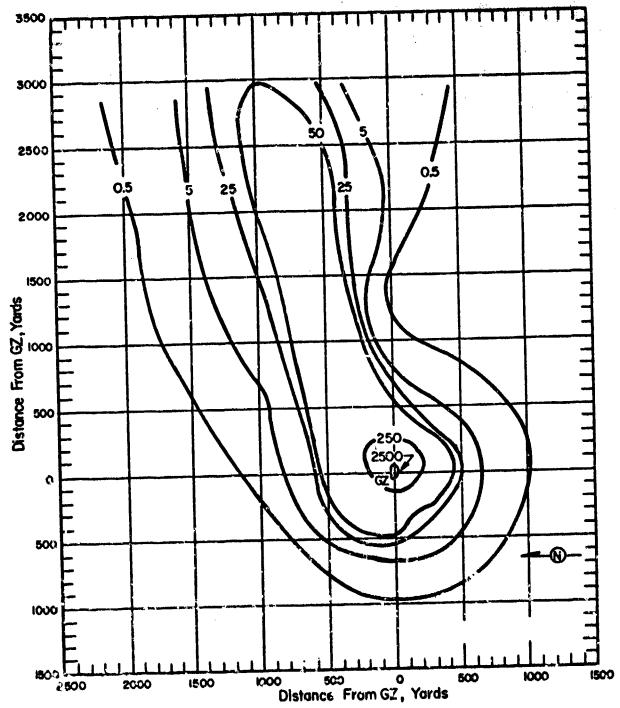


Figure 125. Operation TEAPCT - Hornet. On-site dose rate contours in r/nr at H+1 hour.

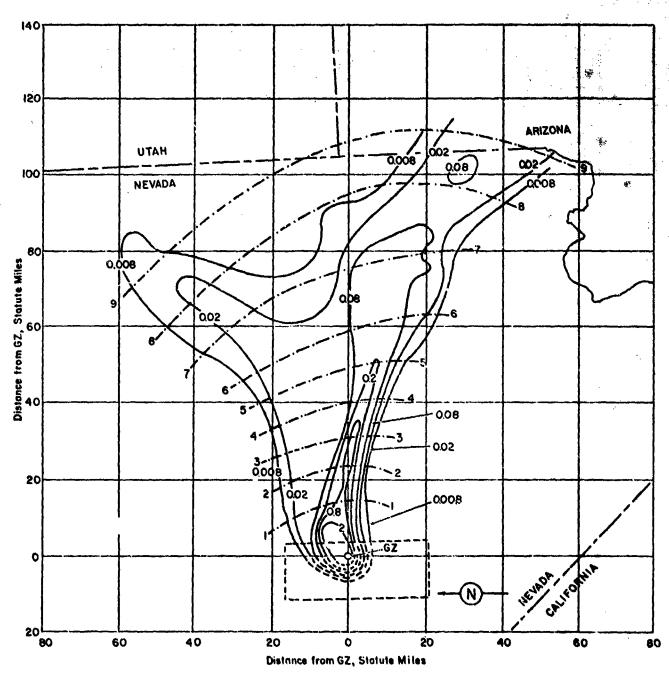


Figure 126. Operation TEAPOT - Hornet. Off-site dose rate contours in r/hr at H+l hour.

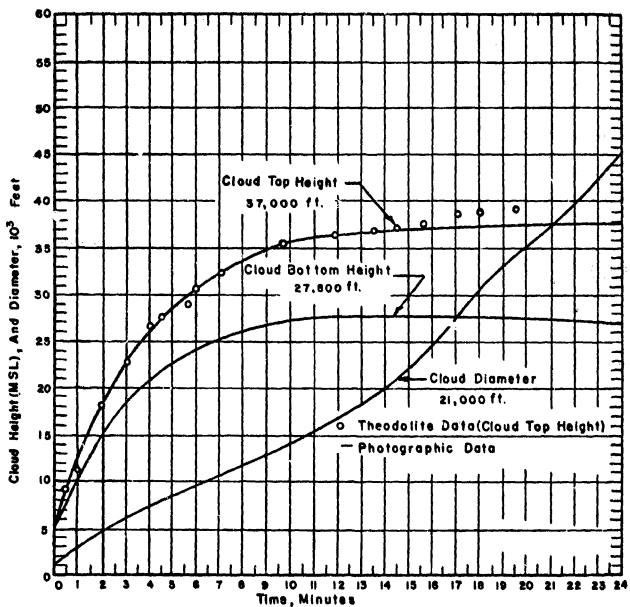


Figure 127. Cloud Dimensions: Operation TFMPOT -

Hornet.

TABLE 37 NEVADA WIND DATA FOR OPERATION TEAPOR-

HORNET

Altitude	H-hor	ır	Altitude	H-hou	r
(MSL)	Dir	Speed	(MSL)	Dir	Speed
feet	degrees	mph	feet	degrees	mph
Surface	220	01	27,000	290	39
5,000	550	07	28,000	290	40
6,000	220	12	29,000	290	<b>J</b> 10
7,000	230	o8	30,000	290	. 40
8,000	260	07	31,000	290	40
9,000	260	07	32,000	280	40
10,000	260	07	33,000	280	7+3
11,000	260	08	34,000	280	46
12,000	270	12	35,000	280	48
13,000	300	12	36,000	280	48
14,000	300	12	37,000	270	51
15,000	280	17	38,000	270	53
16,000	280	20	39,000	270	56
17,000	290	18	40,000	270	61
18,000	300	20	41,000	270	60
19,000	300	25	42,000	270	59
20,000	300	28	43,000	260	53
21,000	290	30	44,000	250	51
22,000	290	33	45,000	250	52
23,000	280	33	46,000	260	58
24,000	280	31	47,000	260	59
25,000	280	31	48,000	260	58
26,000	280	36	49,000	<b>3</b> 60	58
•		-	50,000	260	51

## NOTES:

<sup>1.</sup> Tropopause height was 38,000 ft MSL.
2. At shot height the temperature was 2.0°C and the pressure 874 mb.

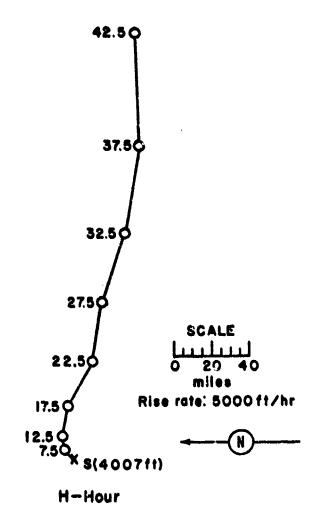


Figure 128. Hodograph for Operation TEAPOT-

Hornet.

OPERATION TEAPOT -

Bee

22 Mir 1955 22 Mar 1955 Sponsor: IASL

DATE: 0505 1305

SITE: Mis - Area 7-la 37° 05' 41" N Site elevation: 4,245 ft

TOTAL YIELD: 8 kt

HEIGHT OF BURST: 500 ft

TYPE OF BURST AND PLACEMENT: Tower burst over Nevada soil

FIREBALL DATA:

Time to lst minimum: 7.0 to 9 msec Time to 2nd maximum: 101 msec Radius at 2nd maximum: 410 ft

CLOUD TOP HEIGHT: 39,700 ft MSL CLOUD BOTTOM HEIGHT: 29,500 ft MSL

CRATER DATA: No crater

### REMARKS:

The on-site pattern was constructed from data resulting from four different ground surveys performed by the Radiological Safety organization from 11+2 hour to D+6 days. AN/PDR-39 instruments were used. Seven stake lines (approximately radial) along existing roads around ground zero aided the survey teams in locating their position. The off-site fallout pattern was drawn from ground-survey readings taken by the off-site Radiological Safety organization. The t-1.2 decay approximation was used to extrapolate the dose-rate readings to H+1 hour for both on-site and off-site patterns.

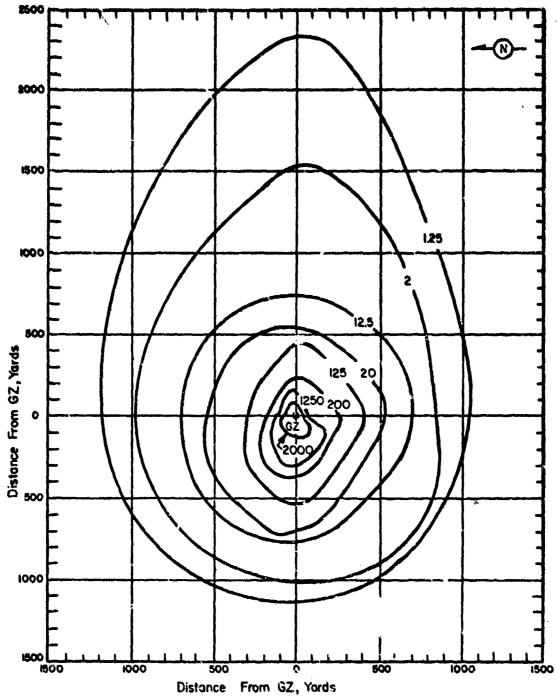


Figure 129. Operation TEAPOT - Bee. On-site dose rate contours in r/hr at H+1 hour.

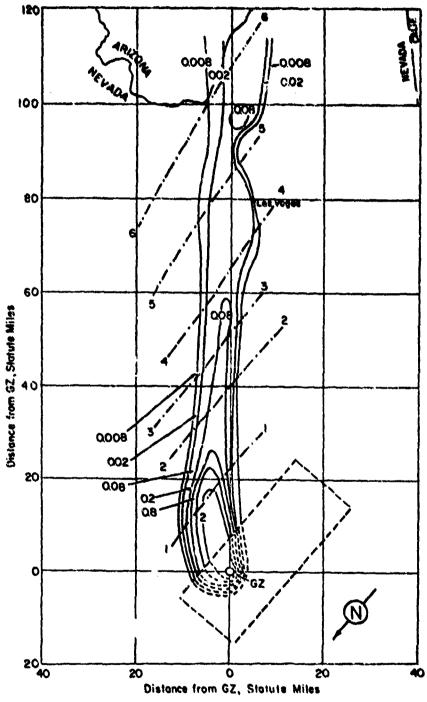


Figure 130. Operation TEAPOT - Bee. Off-site dose rate contours in r/hr at H+1 hour.

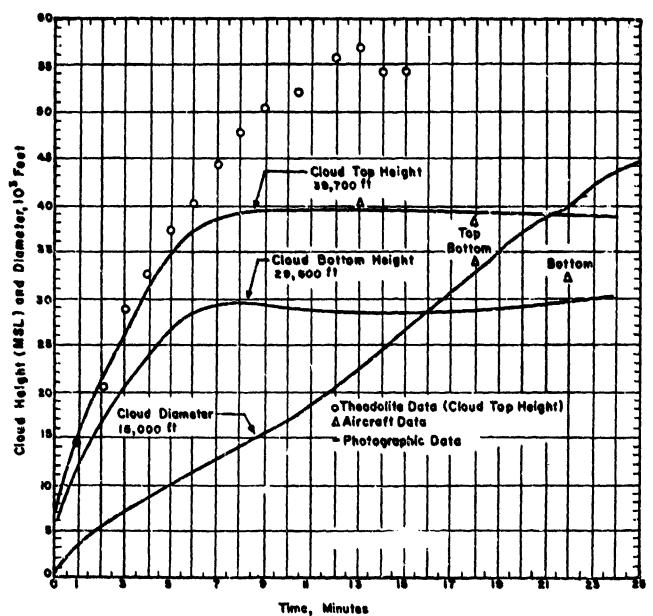


Figure 131. Cloud Dimensions: Operation TEAPOT - Bee.

Altitude	H-hou	H-hour		li-hour	
(MSL)	Dir	Speed	(MSL)	Dir	Speed
feet	dogrees	uph	feet	degrees	mby
Surface	Calm	Ca.J.m	27,000	320	48
5,000	260	02	28,000	320	48
6,000	260	07	29,000	320	48
7,000	<b>860</b>	09	30,000	320	48
8,000	260	09	31,000	320	48
9,000	280	15	32,000	320	48
10,000	300	51	33,000	320	47
11,000	310	<b>2</b> 2	34,000	310	47
12,000	320	29	35,000	310	47
13,000	320	31	36,000	300	48
14,000	330	33	37,000	300	49
15,000	330	36	38,000	300	49
16,000	320	38	39,000	300	48
17,000	320	39	40,000	300	45
18,000	320	44	41,000	300	45
19,000	320	47	42,000	300	45
20,000	320	49	43,000	290	45
21,000	320	45	44,000	290	45
22,000	320	45	45,000	280	45
23,000	320	45	46,000	280	45
24,000	320	45	47,000	280	51
25,000	320	45	48,000	280	53
26,000	320	47	•		_

Tropopause height was 36,500 ft MSL at H-hour.
 At shot height the temperature was 4.5°C and the pressure 860 mb.

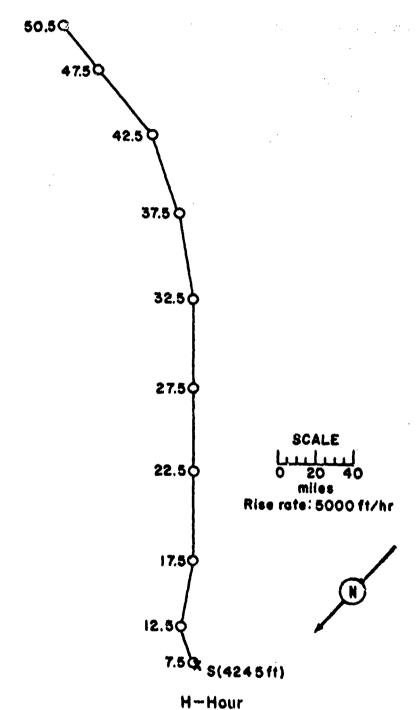


Figure 132. Hodograph for Operation TEAPOT -

Bee.

OPERATION TEAPOT

- Ess

PST GMT

DATE: 23 Mar 1955 23 Mar 1955

TIME: 1230 2030

TOTAL YIELD: 1 kt

FIREBALL DATA:

Time to 1st minimum: NM
Time to 2nd maximum: NM
Radius at 2nd maximum: NM

CRATER DATA: Diameter: 292 ft
Depth: 96 ft
Maximum Dose Rate: 6000 r/hr at
H+l hour at crater lip (extrapolated from readings taken at H+2

hours)

Sponsor: DOD-LASL

SITE: NTS - Area T-10a 37° 10' 06" N 116° 02' 38" W Site elevation: 4,288 ft

TYPE OF BURST AND PLACEMENT:
Subsurface burst in filled
shaft

HEIGHT OF BURST: -67 ft

CLOUD TOP HEIGHT: 12,000 ft MSL CLOUD BOTTOM HEIGHT: NM

#### REMARKS:

The close-in and on-site fallout patterns were constructed from extensive and detailed ground and aerial survey readings of scientific projects and are considered to be accurate.

The off-site fallout pattern was drawn from ground-survey readings taken by the off-site Radiological Safety organization. The  $t^{-1.2}$  decay approximation was used to extrapolate the dose-rate readings to H+1 hour for both on-site and off-site patterns. Some residual contamination from Shot 6 - Bee is included in the readings.

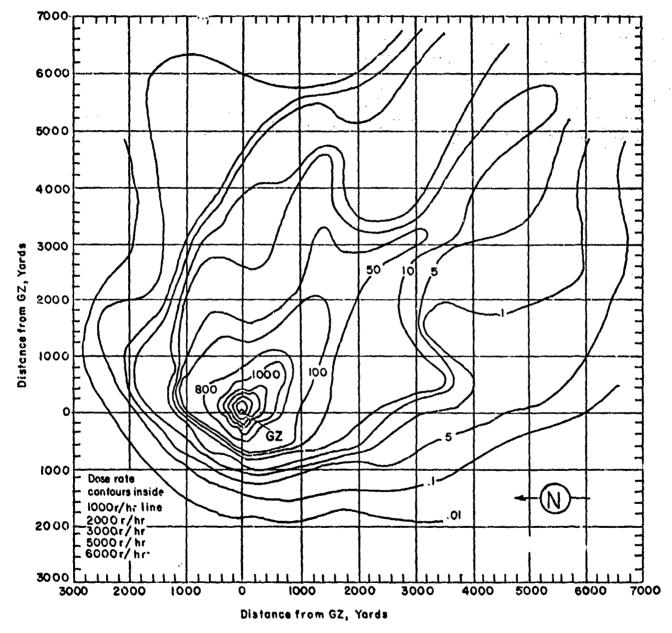


Figure 133. Operation TEAPOT - Ess.

Close-in dose rate contours in r/hr at H+1 hour.

4 W. ..

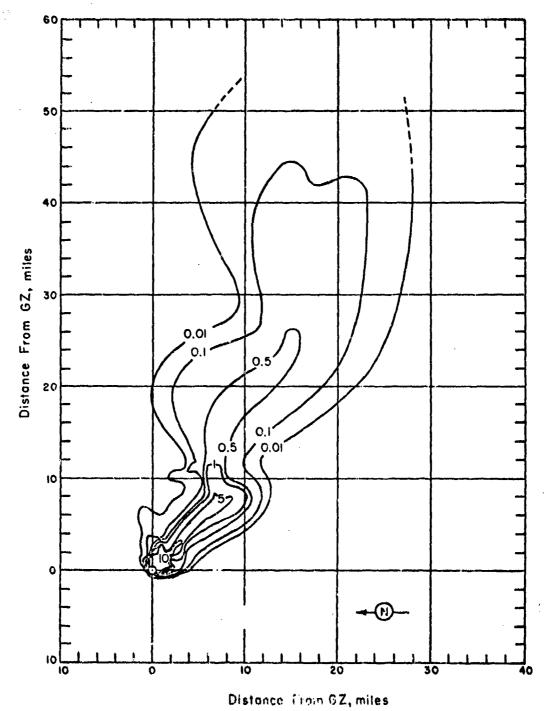


Figure 134. Operation TEAPOT - Ess.
On-site dose rute contours in r/hr at H+1 hour.

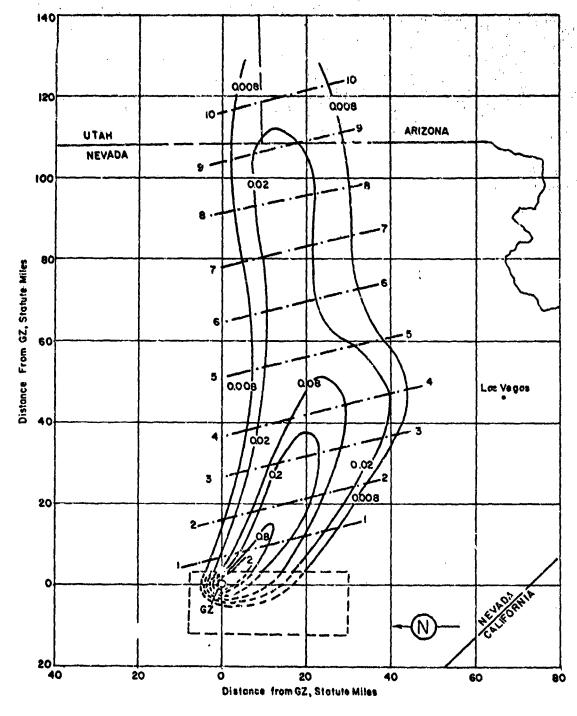


Figure 135. Operation TEAPOT - Ess.
Off-site dose rate contours in r/hr at H+l hour.

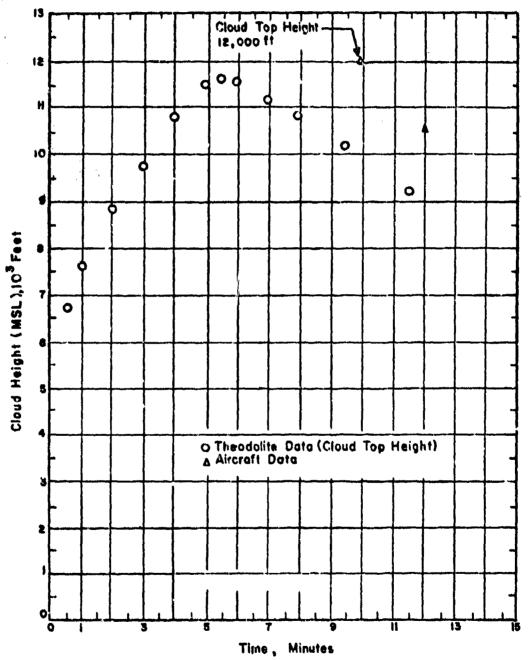


Figure 136. Cloud Dimensions: Operation TEAPOF -

Altitude	ll-hou:	r
(MSI)	Dir	Speed
feet	degrees	mph
Surface	310	12
5,000	310	14
6,000	310	17
7,000	320	17
8,000	320	18
9,000	330	23
10,000	340	29
11,000	350	26
12,000	360	29
13,000	340	26
14,000	330	29
<b>15,0</b> 00	330	36
16,000	310	39
17,000	300	40
18,000	290	41
19,000	290	40
20,000	290	43
21,000	290	43
22,000	290	46
23,000	290	50
24,000	290	55
25,000	290	54
30,000	290	66
35,000	300	59

## NOTES:

Tropopause height was 39,000 ft MSL.
 At the surface the temperature was 18.0°C and the pressure 883 mb.

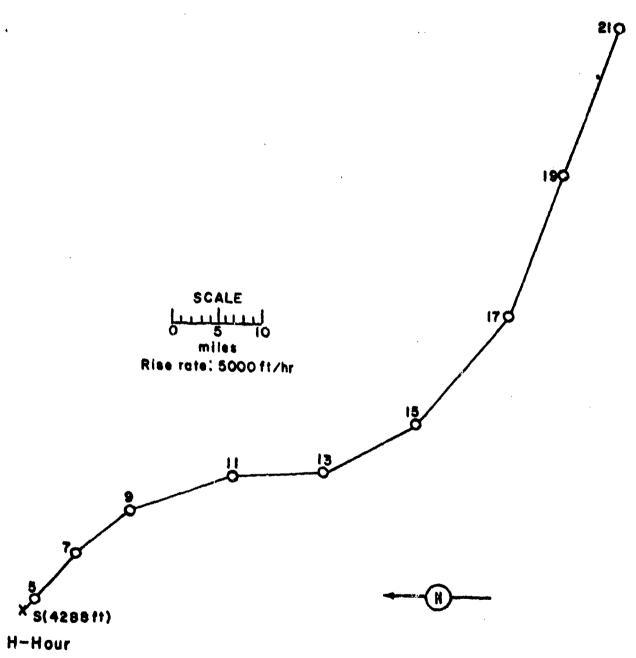


Figure 137. Hodograph for Operation TEAPOT -

Ess.

OPERATION TEMPOT -

Apple I

PST DATE: 29 Mar 1955 29 Mar 1955

TIME: 0455 1.255

NTS - Area 4 37° 05' 114" N 116° 06' 10" W

Sponsor: LASL

TOTAL YIELD: 14 kt

Site elevation: 4,309 ft

INTIGIT' OF BURST: 500 ft

FIREBALL DATA:

Time to 1st minimum: 12.7 to 13.3 msec

Time to 2nd maximum: 165.0 msec

Radius at 2nd maximum: NM

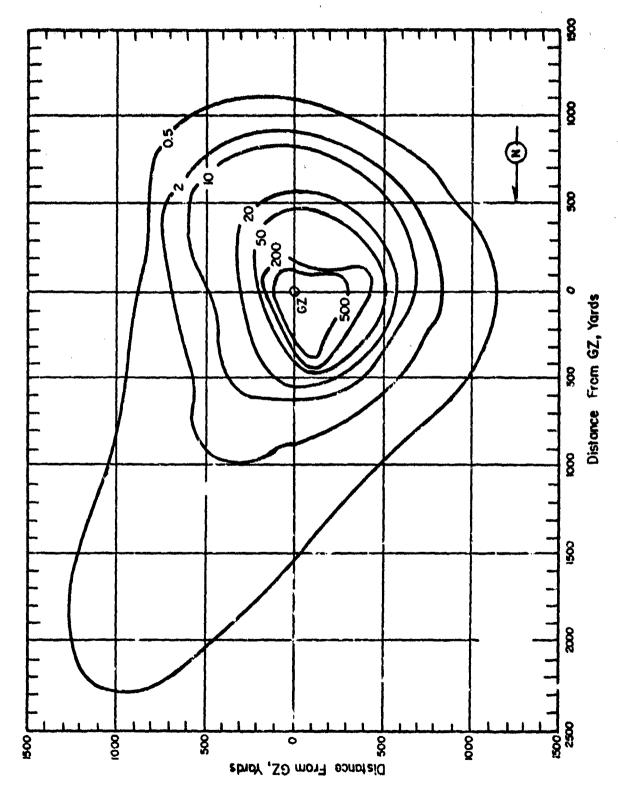
TYPE OF BURST AND PLACEMENT: Tower burst over Nevada soil

CRATER DATA: No crater

CLOUD TOP HEIGHT: 32,000 ft MSL CLOUD BOTTOM HEIGHT: 22,600 ft MSL

#### REMARKS:

The on-site fallout pattern was constructed from six different g. ound surveys performed by the Rid-Safe organization from H+2 hour to D+36 days. AN/PDR-39 instruments were used. Seven stake lines (approx. radial) along existing roads around ground zero aided the survey teams in locating their position. The off-site fallout pattern was drawn from ground-survey readings taken by the off-site Radiological Safety organization. The tales decay approximation was used to extrapolate the dosc-rate readings to H+1 hour for both on-site and off-site patterns.



On-site dose rate Operation TEAPUT - Apple I. contours in r/hr at E+1 hour. Figure 138.

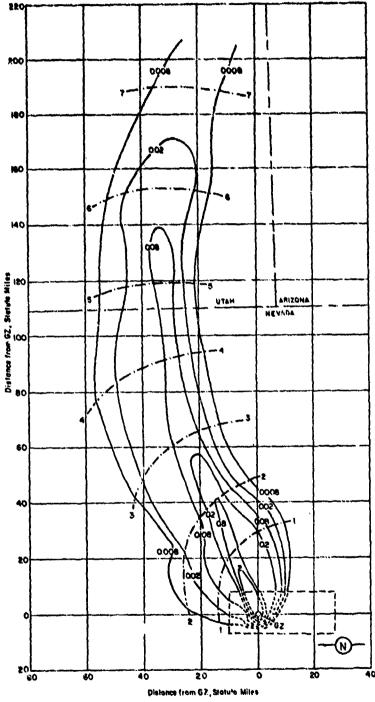


Figure 139. Operation TEAPOT - Apple I. Off-site dose rate contours in r/hr at H+1 hour.

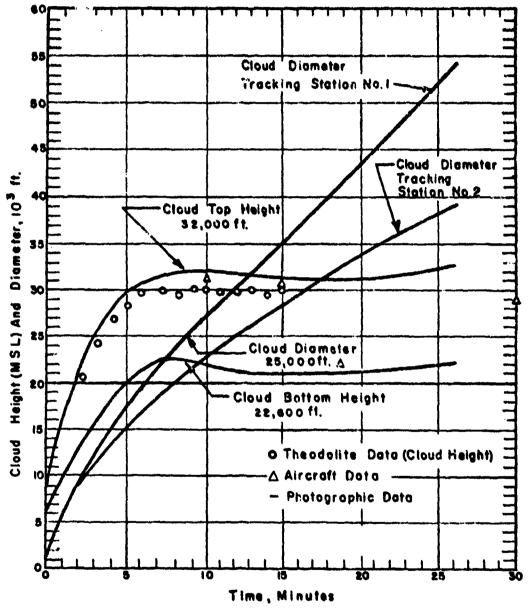


Figure 140. Cloud Dimensions: Operation TEAFOT - Apple I. (Tracking Station No. 1 located 48 miles SF of C. P. and Tracking Station No. 2 50 miles SW of C. P.)

TABLE 40 NEVADA WIND DATA FOR OPERATION TEAFOT-

APPLE I

Altitude	H-hour		H+5 hc	H+5 hours Altit		H-hour		H+5 hours	
(MSL)	Dir	Speed	Dir	Speed	(MSL)	Dir	Speed	Dir	Speed
feet	degrees	mby	degrees	mby	feet	degrees	шђу	dogrees	mph
Surface	260	03	200	18	27,000	260	47	w = #	
5,000	500	10	190	19	28,000	260	52		~-
6,000	180	14			29,000	270	53		
7,000	190	18			30,000	270	53	250	73
8,000	190	23		•=	31,000	270	53		-
9,000	190	25		••	32,000	270	54		
10,000	190	22	230	29	33,000	270	54		••
11,000	500	17			34,000	270	55		
12,000	240	17			35,000	270	55	250	68
13,000	260	24			36,000	270	55		
14,000	260	26			37,000	270	54		
15,000	260	22	240	44	38,000	270	54		
16,000	260	23			39,000	270	57		
17,000	260	29			40,000	270	58	250	68
16,000	260	31			41,000	270	58		
19,000	270	36			42,000	270	57		
20,000	270	39	<b>2</b> 50	52	43,000	270	57		
21,000	270	41			44,000	260	59		
22,000	270	41			45,000	260	62		
23,000	270	44			46,000	260	64		
24,000	270	39			47,000	260	66	* = *	
25,000	270	44	260	61	48,000	260	67		
26,000	260	47	~~-		49,000	260	66		
•		•			50,000	260	64		

# NOTES:

Tropopause height was 39,000 ft MSL.
 At shot height the temperature was 9.3°C and the pressure 852 mb.

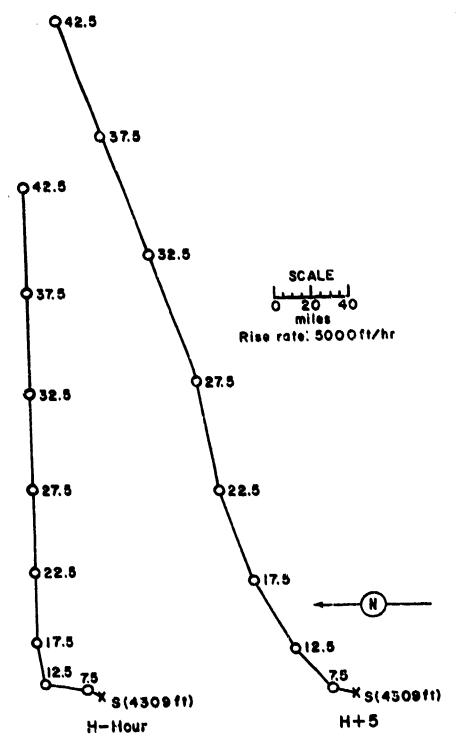


Figure 141. Hodographs for Operation TEAPOT -

Apple I.

OPERATION TEAPOT -

Wasp Prime

PST GMT

DATE: 29 Mar 1955 29 Mar 1955

TIME: 1000 1800

TOTAL YIELD: 3 kt

FIREBALL DATA:

Time to 1st minimum: 5.0 to 6.2 msec Time to 2nd maximum: 69 to 73 msec Radius at 2nd maximum: NM

CRATER DATA: No crater

Sponsor: LASL

SITE: NTS - Area T-7-4 37° 05' 12" N 116° 03' 28" W

Site elevation: 4,194 ft

HEIGHT OF BURST: 739 ft

TYPE OF BURST AND PLACEMENT:
Air burst over Nevada soil

CLOUD TOP HEIGHT: 32,000 ft MSL CLOUD BOTTOM HEIGHT: NM

# REMARKS:

The contours resulting from this shot were due primarily to neutron-induced activity. The local fallout pattern was drawn from ground-survey readings taken at H+1 hour by the Rad-Safe organization with AN/PDR 39 and MX-5 instruments. No decay corrections were necessary.

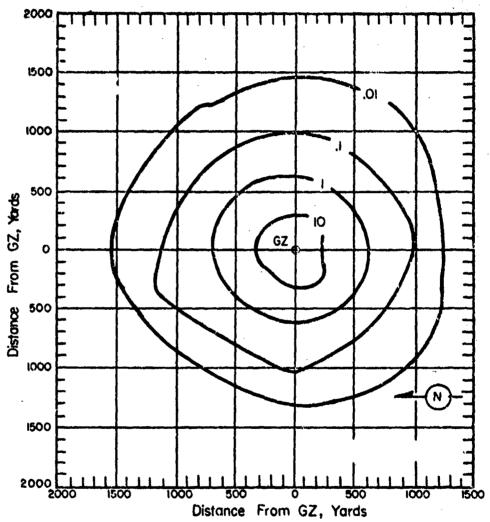


Figure 142. Cperation TEAPOT - Wasp Prime.
On-site dose rate contours in r/hr at H+1 hour.

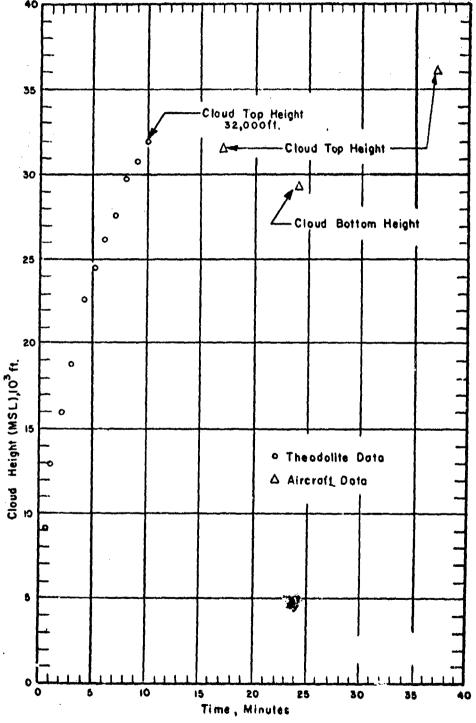


Figure 143. Cloud Dimensions: Operation TEAPOT -

Wasp Prime.

TARLE 41 NEVADA WIND DATA FOR OPERATION TEMPOR-

Altitude	II-ho	ur		Altitude	li-l.c	li-hour	
(MSL)	Dir	Speed	1	(MSIE)	Dir	Speed	
feet	degrees	mph		feet	degrees	mbp	
Surface	500	18.		27,000	250	69	
5.000	190	19		28,000	250	75	
6,000	190	21		29,000	250	75	
7,000	190	23	1	30,000	250	73	
8,000	200	33		31,000	250	69	
9,000	210	33	΄ ι	32,000	250	69	
10,000	230	29	$\mathcal{A}'$	33,000	250	67	
11,000	် နှန်ဂ	36	•	34,000	250	67	
12,000	2ħ0	41		35,000	250	68	
13,000	5/10	42	;	36,000	250	70	
14,000	240	44		37,000	250	72	
15,000	240	44		38,000	250	72	
16,000	5,40	40		39,000	250	69	
17,000	240	38		40,000	250	68	
18,000	250	43		41,000	250	65	
19,000	250	48		42,000	250	65	
20,000	250	-52		43,000	250	69	
21,000	26C	54	1	414,000	250	71	
22,000	260	50		45,000	250	∶6 <del>9</del>	
23,000	260	52		46,000	250	61	
24,000	260	54		47,000	250	52	
25,000	260	61		48,000	250	46	
26,000	250	66		49,000	240	41	
-				50,000	240	48	

# NOTES:

Tropopause height was 40,000 ft MSL.
 At shot height the temperature was 12.4°C and the pressure 845 mb.

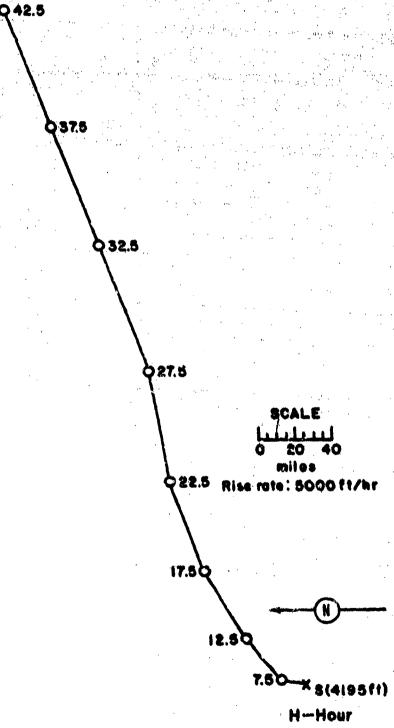


Figure 144. Hodograph for Operation TEAPOT -

Wasp Prime.

OPERATION TEAPOL .

6 Apr 1955 6 Apr 1955

1000 TIME: 1800 Sponsor: SITE:

37° 01' 1160 03' Site elevation:

TOTAL YIELD: 3 kt

HEIGHT OF BURST: 32,582 ± 100 ft Air burst over Nevada soil

FIREBALL DATA:

Time to 1st minimum: 4.5 to 5.6 msec Time to 2nd maximum: 42.5 to 60 msec

Radius at 2nd maximum: NM

CLOUD TOP HEIGHT: 55,000 ft MSL

CLOUD BOTTOM HEIGHT: NM

CRATER DATA: No crater

# REMARKS:

No significant fallout or induced activity was observed.

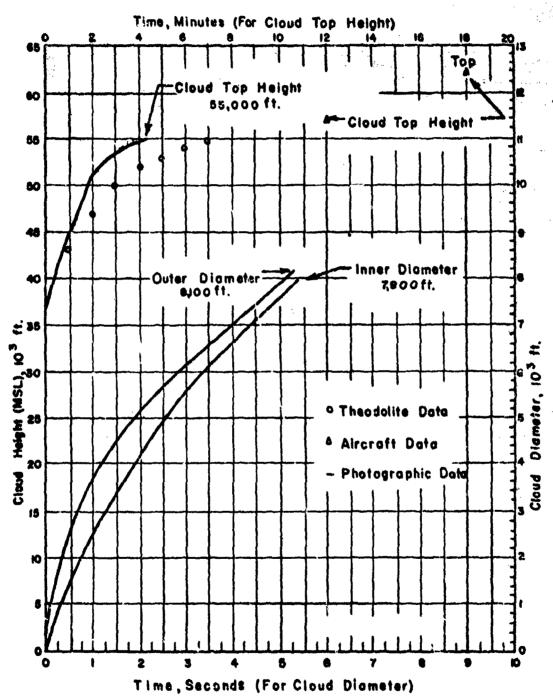


Figure 145 . Cloud Dimensions: Operation TEAPOT -

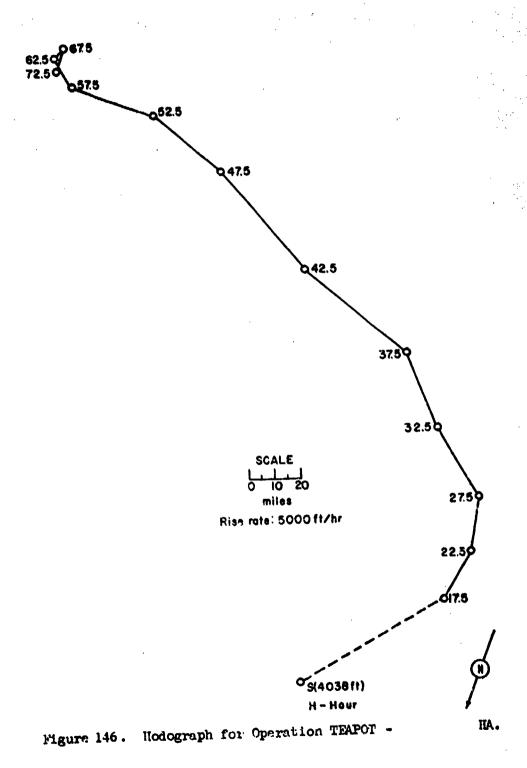
HA.

TABLE 42 NEVAIA WIND DATA FOR OPERATION TEAPOR-

			· · · · · · · · · · · · · · · · · · ·			
Altitude	ll-hou	r	Altitude	II-hour		
(MSL)	Dir	Speed	(MSL)	Dir	Speed	
fect	degrees	mbp	fect	degrees	mph	
20,000	01.0	21	46,000	300	46	
21,000	360	23	47,000	290	44	
22,000	360	28	48,000	290	35	
23,000	010	22	49,000	290	33	
24,000	360	23	50,000	290	33	
25,000	350	21	51,000	280	33	
26,000	340	22	52,000	270	31	
27,000	340	29	53,000	270	31	
28,000	340	30	54,000	270	33	
29,000	320	29	55,000	270	33	
30,000	310	31	56,000	280	38	
31,000	310	35	57,000	290	29	
32,000	310	36	58,000	300	25	
33,000	320	35	59,000	300	18	
34,000	350	33	60,000	310	13	
35,000	0د ٠	31	61,000	320	10	
36,000	့ာဝ	35	62,000	340	06	
37,000	300	33	63,000	010	05	
38,000	300	36	64,000	030	05	
39,000	300	44	65,000	030	06	
40,000	390	50	66,000	090	06	
41,000	≥90	52	67,000	100	69	
42,000	<i>-</i> 90	54	68,000	140	08	
43,000	290	53	<b>69,</b> 000	180	09	
44,000	300	52	70,000	180	09	
45,000	3( )	50	- <b>"</b>		•	

# NOTES:

Tropopause height was 31,000 ft MSL.
 At shot height the temperature was -47.7°C and the pressure 222 mb.



OPERATION TEAPOT -

Post

PST GMT

DATE: 9 Apr 1955 9 Apr 1955

TIME: 0430 1230

Sponsor: UCIL

MODAL VILLE 1 2 Le

SITE: MTS - Area - 9c 37° 07' 80" N 116° 02' 04" W Site elevation: 4,236 ft

TOTAL YIELD: 2 kt

HEIGHT OF BURST: 300 ft

FIREBALL DATA:

Time to 1st minimum: 3.9 msec
Time to 2nd maximum: 40.3 msec
Radius at 2nd maximum: NM

TYPE OF BURST AND PLACEMENT:
Tower burst over Nevada soil

CRATER DATA: No crater

CLOUD TOP HEIGHT: 15,500 ft MSL.

#### REMARKS:

The on-site contamination was due primarily to neutron-induced activity. The pattern was drawn from four different ground surveys made by the Rad-Safe organization between H+1 hour and D+2 days. The general decay curve for Nevada soil was used to extrapolate the data to H+1 hour. The off-site fallout pattern was drawn from ground-survey readings taken by the off-site Radiological Safety organization. The t<sup>-1.2</sup> decay approximation was used to extrapolate the dose-rate readings to H+1 hour.

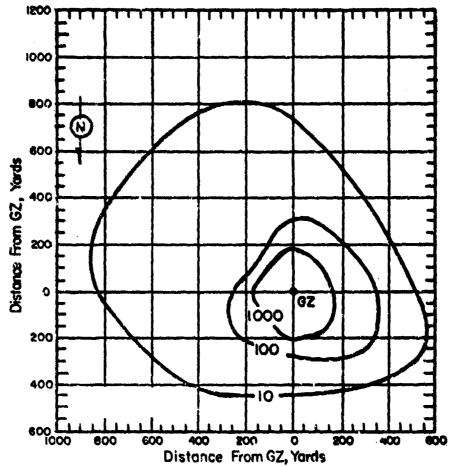


Figure 147. Operation TEAPOT - Post. On-site dose rate contours in r/hr at H+l hour.

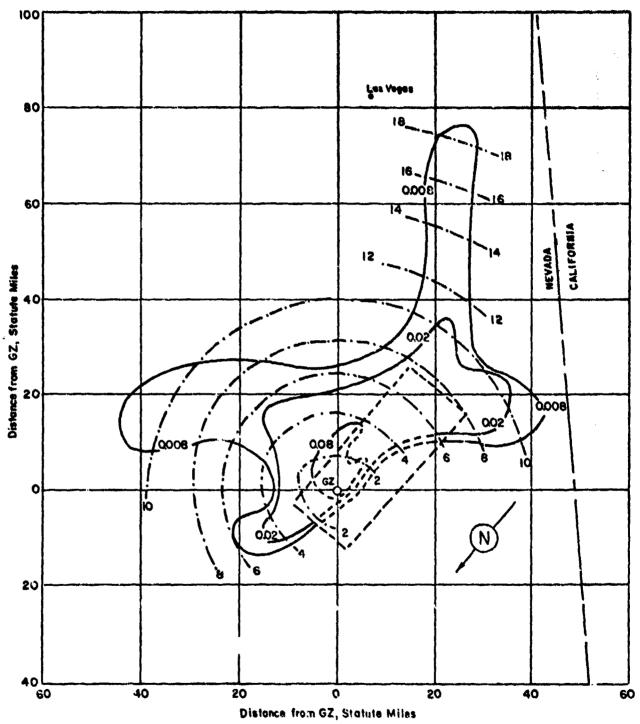


Figure 148. OPERATION TEAPOT - Post. Off-site dose rate contours in r/hr at H+1 hour.

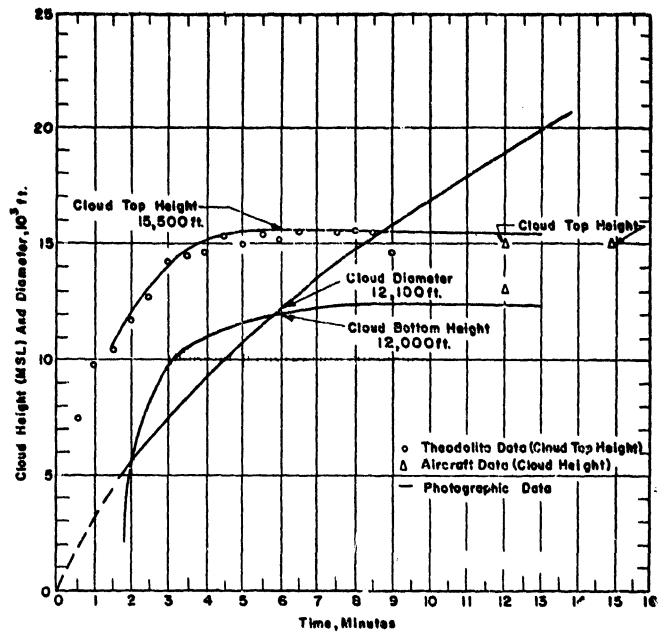


Figure 149. Cloud Dimensions: Operation TEAPOT -

Post.

Altitude	li-ho	ינגי	Altitude	H-hour	
(MSL)	Dir	Speed	(MBL)	Dir	Speed
feet	degrees	व्यक्री	feet	degrees	<b>May</b>
Surface	Calm	Calm	14,000	350	80
5,000	Calm	Calu	16,000	330	09
6,000	Calm	Calm	18,000	330	14
7,000	Calm	Calm	20,000	350	15
8,000	Ca lm	Calm	23,000	010	23
9,000	Calm	Calm	25,000	350	29
10,000	Calm	Calm	30,000	350	
11,000	Calm	Calm	35,000	010	31 41
12,000	Calm	Calm	40,000	360	40
13,000	Calm	Calm	45,000	320	24
- •			50,000	250	29

NOTE: At burst height the temperature was 4.5°C and the pressure 867 mb.

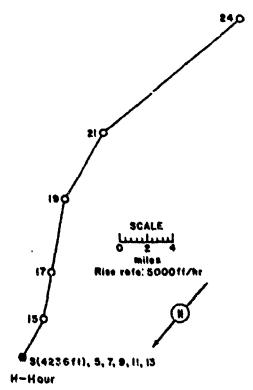


Figure 150. Hodograph for Operation TEAPOT -

Post.

OPERATION TEAPOT -

Met

PST CMT

DATE: 15 April 1955 15 April 1955
TIME: 1115 1915

TOTAL YIELD: 22 kt

FIREBALL DATA:

Time to 1st minimum: 17.2 msec
Time to 2nd maximum: NM

Radius at 2nd maximum: NM

CRATER DATA: No crater

Sponsor: DOD - IASL

SITE: NTS - Area FF

36 ° 47' 53" N 115 ° 55' 44" W

Sit elevation: 3,078 ft

HEIGHT OF BURST: 400 ft

TYPE OF BURST AND PLACEMENT:
Tower burst over Nevada soil

CLOUD TOP HEIGHT: 40,300 ft MSL CLOUD BOTTOM HEIGHT: 31,800 ft MSL

#### REMARKS:

The on-site fallout pattern was constructed from surveys performed by Rad-Safe organization between  $H^{+\frac{1}{2}}$  hour and  $H^{+\frac{1}{2}}$  hours. AN/PDR-39 instruments were used. Eight stake lines (approximately radial) along existing roads around ground zero aided the survey teams in locating their position. No decay corrections were made. The off-site fallout pattern was drawn from ground-survey readings taken by the off-site radiological safety organization. The  $t^{-1\cdot 2}$  decay approximation was used to extrapolate the dose-rate readings to H+1 hour.

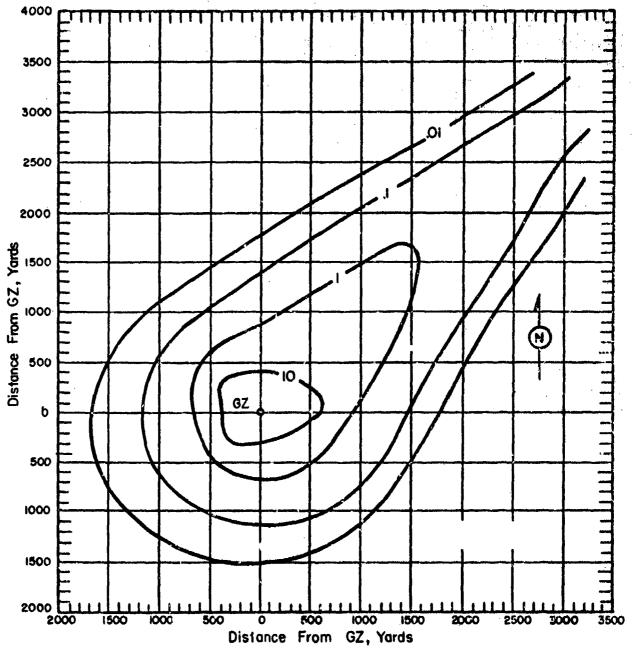


Figure 151. Operation TEAPOT - Met. On-site dose rate contours in r/hr at H+1 hours.

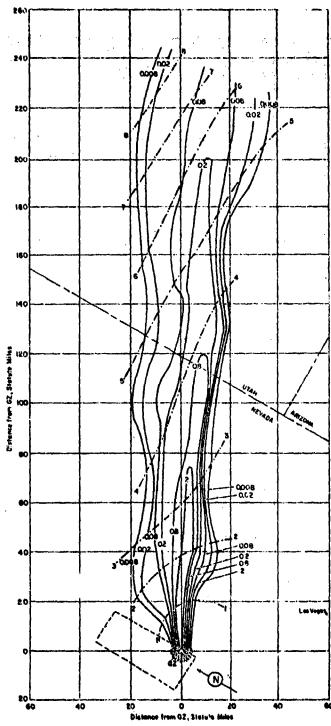


Figure 152. Operation TEAPOT - Met. Off-site dose rate contours in r/hr at H+1 hour.

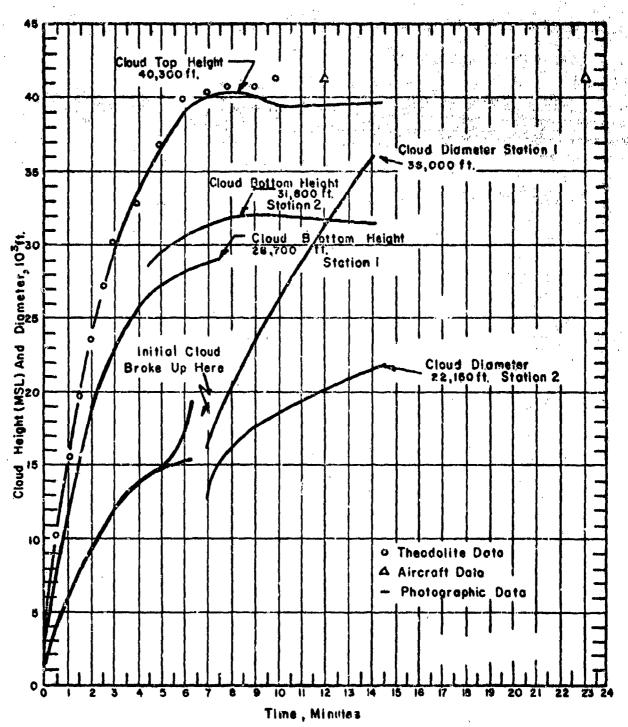


Figure 153. Cloud Dimensions: Operation TEAPOT - Met (Station No. 1 located 48 miles SE of C. P. and Station No. 2 located 50 miles SW of C. P.).

TABLE 44 NEVADA WIND DATA FOR OPERATION TEAPOR-

	•		· · · · ·				
Altitude	H-ho	ur		Altitude	il-hour		
(MSL)	Dir	Speed	1	(MSL)	Dir	Speed	
feet	degrees	mph		feet	degrees	mph	
Surface	200	16	* * * * * * * * * * * * * * * * * * *	27,000	250	69	
5,000	210	09	**	28,000	250	70	
6,000	570	11		29,000	250	71	
7,000	510	15	•	30,000	250	73	
8,000	210	18		31,000	250	73	
9,0∞	550	16		32,000	250	73	
10,000	240	17		33,000	540	76	
11,000	250	23		34,000	240	80	
12,000	260	24		35,000	5/10	84	
13,000	270	32		36,000	240	86	
14,000	2 <b>6</b> 0	29	,	37,000	240	87	
15,000	250	35		38,000	240	87	
16,000	2110	38		39,000	240	86	
17,000	240	40		40,000	240	84	
18,000	240	37		41,000	Sj+0	82	
19,000	240	33		42,000	240	80	
20,000	240	37		43,000	240	78	
21,000	240	40		44,000	240	76	
22,000	250	46		45,000	240	77	
23,000	250	54		46,000	240	: 8 <b>3</b>	
24,000	250	62		47,000	240	85	
25,000	250	64		48,000	S <del>i</del> to .	87	
26,000	250	67		49,000	240	90	
<b>,</b>		•		50,000	240	88	

NOTES:

1. Tropopause height was 37,000 ft MSL.

2. At shot height the temperature was 18.5°C and the pressure 830 mb.

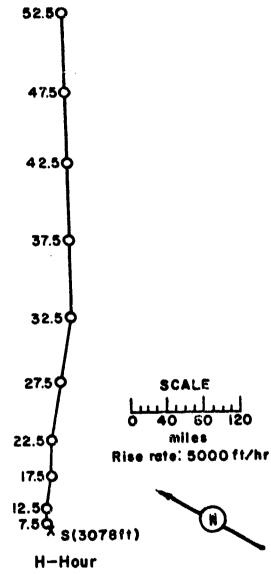


Figure 154. Hodograph for Operation TEAPOT -

Met.

OPERATION TEAPOR -

Apple II

PDT GMT

DATE: 5 May 1955 5 May 1955

TIME: 0510 1210

TOTAL YIELD: 29 kt

FIREBALL DATA:

Time to 1st minimum: 17.7 - 18.3 msec

Time to 2nd maximum: NM Radius at 2nd maximum: NM

Sponsor: LASL

SITE: NTS - Area - 1 36° 03' 11" N 116° 06' 09" W Site elevation: 4,236 ft

HEIGHT OF BURGE: 500 ft

TYPE OF BURST AND PLACEMENT:
Tower burst over Nevada soil

CLOUD TOP HEIGHT: 51,000 ft MSL CLOUD BOTTOM HEAGHT: 34,500 ft MSL

### REMARKS:

The on-site fallout pattern was constructed from three different ground surveys performed by the Rad-Safe organization between  $H^{\frac{1}{2}}$  hour and D+4 days. AN/PDR-39 instruments were used. Eight stake lines (approximately radial) along existing roads around ground zero aided the survey teams in locating their position. The off-site fallout pattern was drawn from ground-survey readings taken by the off-site Radiological Safety organization. The  $t^{-1.2}$  decay approximation was used to extrapolate the dose-rate readings to H+1 hour for both on-site and off-site patterns.

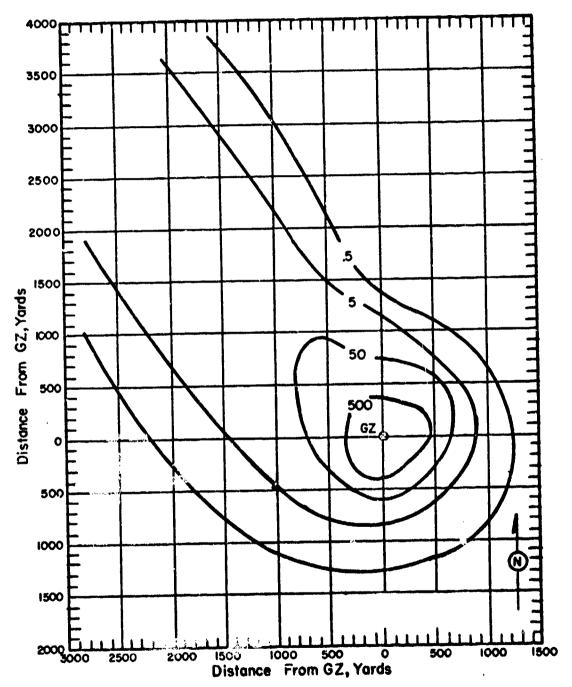


Figure 155. Operation TEAPOT - Apple II On-site dose rate content in r/hr at H+1 hour.

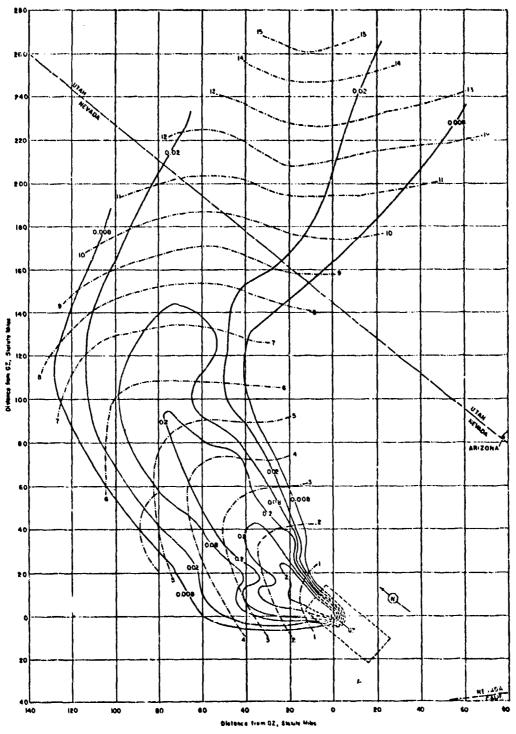


Figure 156. Operation TEAPOT - Apple II.
Off-site dose rate contours in r/hr at li+l hour.

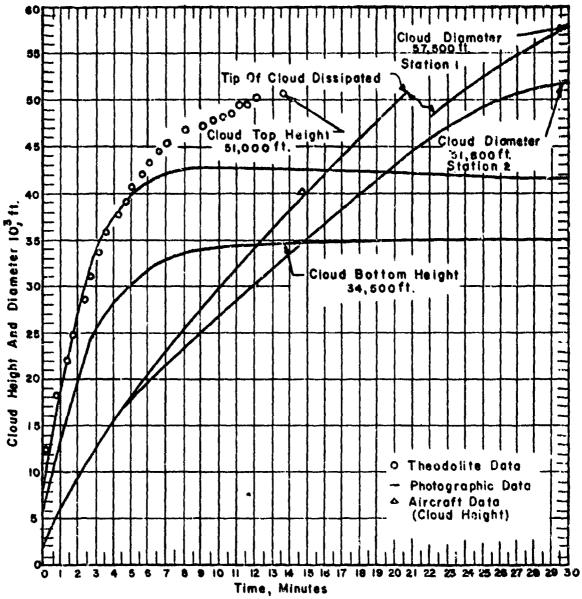


Figure 157. Cloud Dimensions: Operation TEAPOT - Apple II. (Tracking Station No. 1 located 48 miles SE of C. P. and Tracking Station No. 2 50 miles SW of C. P.).

THE STATE OF THE PARTY OF THE P

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TABLE 45 NEVADA WIND DATA FOR OPERATION THAPOT-

APPLE II

Altitude	II-ho	ur	Altitude	II-ho	ur
(MSL)	Dir	Speed	(MSL)	Dir	Speed
feet	degrees	mph	feet	dogrees	mpli
Surface	Ca l.m	Calm	27,000	200	23
5,000	Calm	Calm	28,000	210	24
6,000	Calm	Calm	29,000	210	25
7,000	120	06	30,000	210	25
8,000	130	80	31,000	220	23
9,000	140	1.4	32,000	230	22
10,000	150	16	33,000	230	24
11,000	150	14	34,000	230	58
12,000	160	17	35,000	230	30
13,000	160	25	36,000	230	32
14,000	170	<b>3</b> 5	37,000	230	35
15,000	170	37	38,000	530	36
16,000	170	38	39,000	230	36
17,000	180	38	40,000	550	33
18,000	180	35	41,000	550	32
19,000	180	36	42,000	<b>S</b> 50	31
20,000	180	36	43,000	510	29
21,000	180	36	44,000	510	31
22,000	180	36	45,000	210	32
23,000	180	32	46,000	210	33
24,000	190	30	47,000	210	37
25,000	190	26	48,000	210	38
26,000	500	23	49,000	210	39
•			50,000	220	41

# NOTES:

<sup>1</sup> Tropopause height was 41,000 ft MSL at R-hour.
2. At shot height the temperature was 15.6°C and the pressure 855 mb.

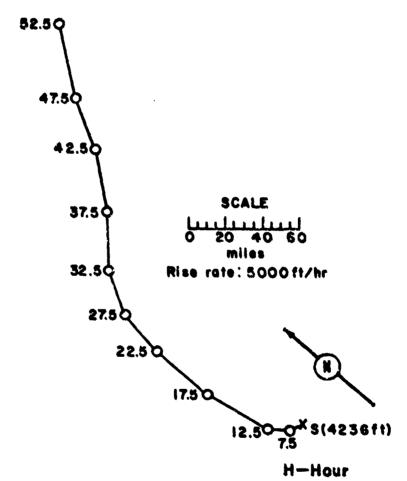


Figure 158. Hodograph for Operation TEAPOT -

Apple II.

OPERATION TEAPOR -

Zucchini

PDT GMT 15 May 1955 15 May 1955 Sponsor: IASL

TIME: 0500 1200

NTS - Area 7-la 370 05' 41" N SITE: 716° 01' 26" W Site elevation: 4,245 ft

TOTAL YIELD: 28 kt

HEIGHT OF BURST: 500 ft

FIREPALL DATA:

Time to 1st minimum: Time to 2nd maximum: Radius at 2nd maximum: NM TYPE OF BURST AND PLACEMENT: Tower burst over Nevada soil

CLOUD TOP HEIGHT: 40,000 ft MSL CLOUD BOTTOM HEIGHT: 25,200 ft MCL

CRATER DATA: No crater

#### REMARKS:

The on-site fallout pattern was constructed from two different ground surveys performed by the Rad-Safe organization between H+2 hour and D+1 day. AN/PDR-39 instruments were used. Seven stake lines (approximately radial) along existing roads around ground zero aided the survey teams in locating their position. The off-site fallout pattern was drawn from ground-survey readings taken by the off-site Radiological Safety organization. The t-1.2 decay approximation was used to extrapolate the dose-rate readings to H+1 hour for both on-site and off-site patterns.

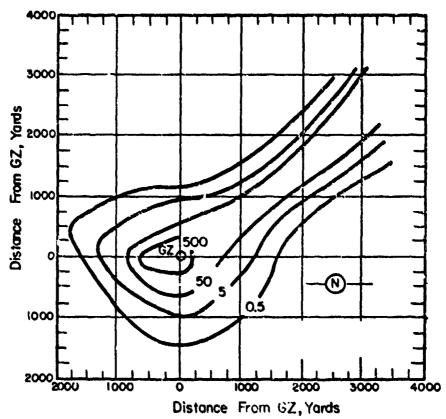


Figure 159. Operation TEAFOT - Zucchini.
On-site dose rate contours in r/hr at H+l hour.

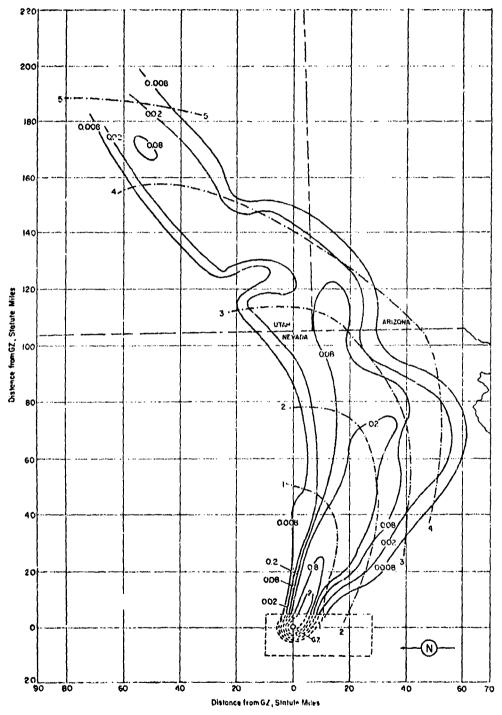
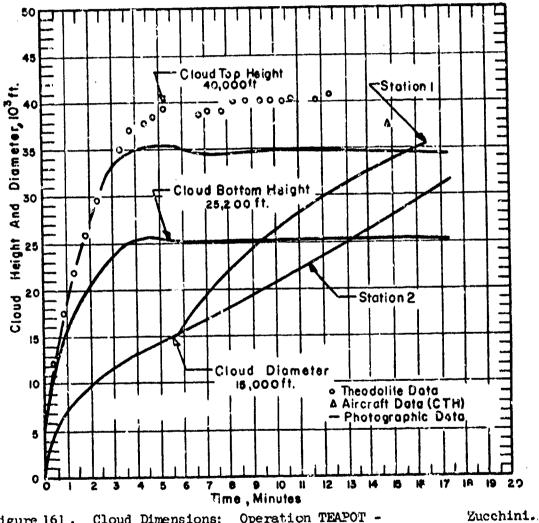


Figure 160. Operation TEAPOT - Zucchini. Off-site dose rate contours in r/hr at H+l hour.



Operation TEAPOT -Cloud Dimensions: Figure 161.

TABLE 46 NEVADA WIND DATA FOR OPERATION TEAPOR-

				·		
Altitude	II-hour			Altitude	H-hour	
(MSL)	Dir	Speed		(MSI,)	Dir	Speed
feet	degrees	dqnf	,	feet	degrees	mph
Surface	320	07	•	26,000	260	74
5,000	330	14	•	27,000	260	77
6,000	340	13		28,000	260	82
7,000	340	80		29,000	270	83
8,000	340	97		30,000	270	83
9,000	330	09		31,000	270	82
10,000	310	13		32,000	260	80
11,000	300	17		33,000	260	· 77
12,000	310	25		34,000	260	75
13,000	310	29	•	35,000	250	74
14,000	310	35		36,000	250	74
15,000	310	40	'. ·	37,000	250	76
16,000	310	45		კმ,000	250	79
17,000	300	48		39,000	260	80
18,000	300	49	,	40,000	. 260	78
19,000	290	46		42.,000	260	72
20,000	290	46		42,000	260	63
21,000	290	49		43,000	260	67
22,000	280	59		44,000	260	. l <sub>1</sub> 1
23,000	270	59		45,000	250	39
24,000	270	63		46,000	240	41
25,000	260	69		47,000	230	46
				48,000	240	45
				49,000	250	40
			•	50,000	250	31

NOTES:

1. Tropopeuse height was 44,000 ft MSL.

2. At shot height the temperature was 2.1°C and the pressure 851 mb.

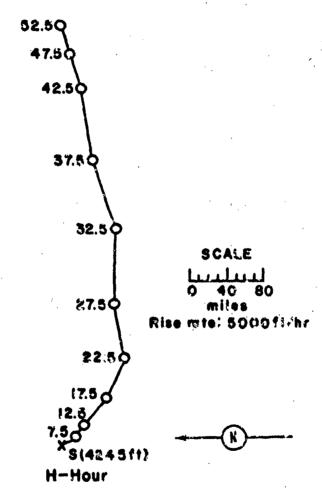


Figure 162. Hodograph for Operation TEAPOF -

Zucchini.

# 56 PROJECT - Safety Experiment No. 1

PST CMT

DATE: 1 Nov 1955 1 Nov 1955

TIME: 1410 2210

Sponsor: LASL

SITE: NTS - Area lla

Site elevation: 4,200 ft

HEIGHT OF BURST: Surface

TYPE OF BURST AND PLACEMENT:
Surface burst on Nevada soil

CLOUD TOP HEIGHT: NM
CLOUD BOTTOM HEIGHT: NM

## REMARKS:

No fission product fallout resulted from this test. Alpha surface contamination extended about 70 feet from ground zero, apparently in all directions. At one point, approximately 400 yards from ground zero, alpha readings of 200 to 3500 counts/min were observed on the recovery cable and samples. The alpha readings were taken with the "Pee-Wee" alpha survey meter. This survey meter is a battery operated proportional counter with a separate alpha-sensitive probe which has a steel grid over 0.25-mil mylar with an effective area of 55 cm<sup>2</sup>.

# 56 PROJECT - Safety Experiment No. 2

PST GMT

DATE: 3 Nov 1955 3 Nov 1955

TIME: 1315 2115

Sponsor: LASL

SITE: NTS - Area 11B
Site elevation: 4,200 ft

HEIGHT OF BURST: Surface

TYPE OF BURST AND PLACEMENT:
Surface burst on Nevada soil

The Section of the Se

CLOUD TOP HEIGHT: NM CLOUD BOTTOM HEIGHT: NM

### REMARKS:

No fission product fallout resulted from this test. "Alpha surface contamination levels around the zero pad were in excess of  $2x10^8$  counts/min. In general, the plywood from the zero shack was a factor of 10 higher in alpha activity than the metal liner, with the plywood reading about  $2x10^8$  counts/min. At 400 yards from zero the cable showed 10,000 to 20,000 counts/min alpha and the sample holders above 20,000 counts/min."

# 56 PROJECT -Safety Experiment No. 3

PST GMT

DATE: 5 Nov 1955 5 Nov 1955

TIME: 1155 1955

Sponsor: LASL

SITE: NTS - Area 11C Site elevation: 4,200 ft

HEIGHT OF BURST: 3 ft

TYPE OF BURST AND PIACEMENT:
Surface burst on Nevada soil

CLOUD TOP HEIGHT: NM CLOUD BOTTOM HEIGHT: NM

### REMARKS:

No significant fission product fallout resulted from this test. "A maximum of 120 mr/hr gamma at H+1 hour was found at the center of the zero pad. The level decreased rapidly to less than 1 mr/hr at approximately 100 feet from the center."

"Alpha surface contamination levels around the zero pad were lower than on Shot 2 by about a factor of 10, with the plywood exhibiting higher readings than the metal, as before."

# 56 PROJECT - Safety Experiment No. 4

PST time CMT

DATE: 18 Jan 1956 18 Jan 1956

TIME: 1330 2130

Sponsor: LASL

SITE: NTS - Area 11D Site elevation: 4,200 ft

HEIGHT OF BURST: 3 ft

EYER OF BURST AND PLACEMENT:
Surface burst on Nevada soil

CLOUD TOP HEIGHT: 3,000 ft above GZ CLOUD BOTTOM HEIGHT: 2,000 ft above

# REMARKS:

The on-site fallout pattern was obtained by ground surveys made by scientific projects along a thoroughly marked sampling array. The  $t^{-1\cdot 2}$  decay approximation was used to extrapolate the dose rates to H+1 hour. Extensive alpha contamination was encountered. An alpha concentration of 1,000 dis/min/in² correlated with the 1.0 r/hr at H+1 hour gamma contour dose in, and also with the 10 mr/hr at H+1 hour gamma contour further out.

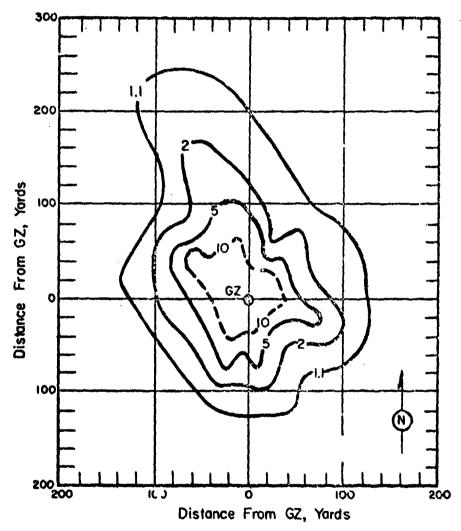
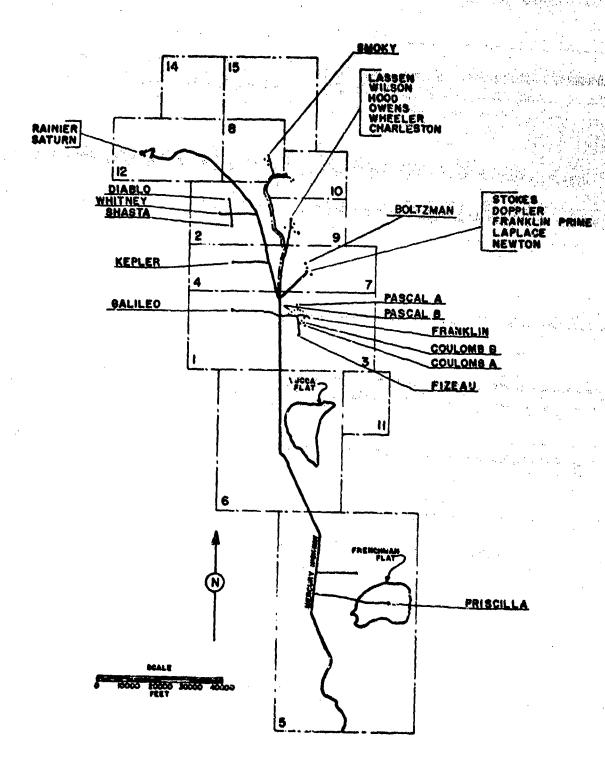


Figure 163. 56 PROJECT - Safety Experiment No. 4 On-site dose rate contours in r/hr at H+1 hour.



NEVADA TEST SITE

Figure 164. Operation PLUMBBOB, Shot Locations.

AN against and

# OPERATION PLUMBBOB - Safety Experiment No. 5 - 57 Test Group

PST OMT DATE: 24 Apr 1957 24 Apr 1957 TIME: 0627 1427 Sponsor: LASL - DOD

SITE: NTS - Area 13
Site elevation: 4,585 ft

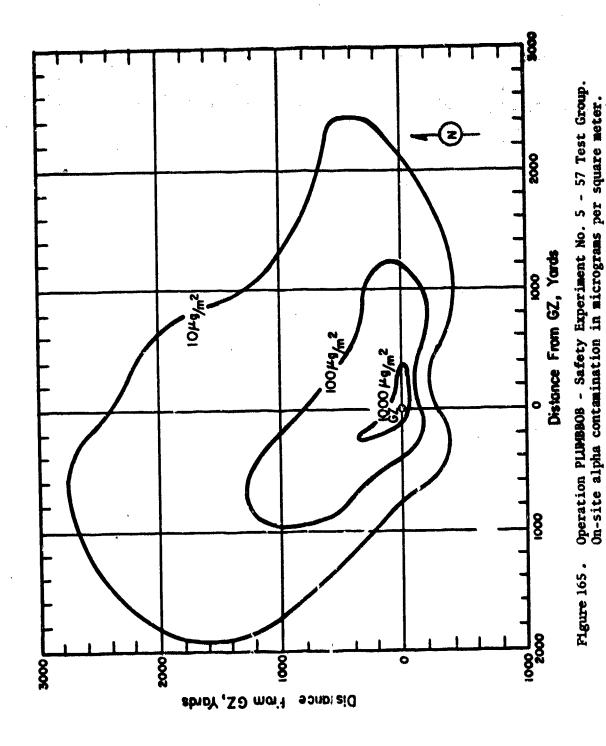
HETGHT OF BURST: Surface

TYPE OF BURST AND PLACEMENT: Surface burst on Nevada soil

CLOUD TOP HEIGHT: 750 ft CLOUD BOTTOM HEIGHT: 400 ft

# REMARKS:

Only alpha contamination was observed. The survey was made with gas proportional alpha counters (Model PAC-IG) over concrete pads. The concrete pads were placed next to fallout collectors. The alphasurvey contours were adjusted by using results of radiochemical analyses of the fallout collector contents.



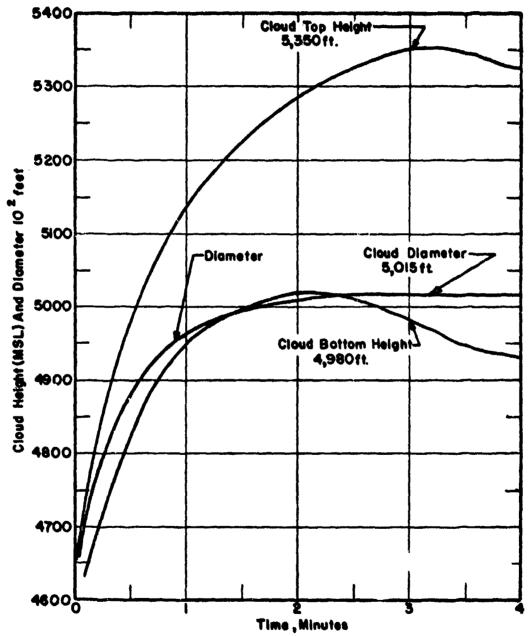


Figure 166. Cloud Dimensions: Operation PLUMBBOB Safety Experiment No. 5 - 57 Test Group

# KEVADA WIND DATA FOR OPERATION PLUMBBOB SAFETY EXPERIMENT NO. 5 - 57 TEST GROUP

Wind velocities were measured using theodolites at two stations during the period H-2 hours to H+l½ hours. Light winds (2 to 6 miles per hour) and high shear existed during the period of observation for the height range, surface to 1000 feet. The resulting hodographs from the two stations differ markedly from each other and are not consistent with the observed alpha contamination pattern. Probably the best description of the mean wind structure is provided by a reconstruction based upon ground and aerial photography of the cloud. The hodograph shown in figure 279 is based upon such photographic observations

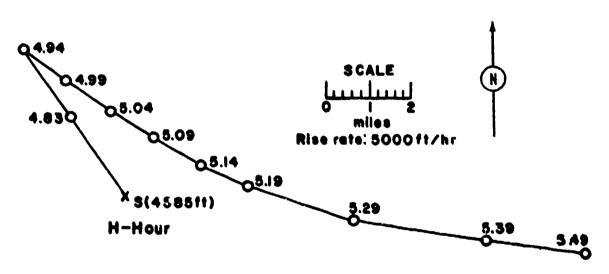


Figure 167. Hodograph for Operation PLUMBBOB Safety Experiment No. 5 - 57 Test Group.

Boltzmann

PDT GMT 28 May 1957 28 May 1957

TIME: 0455 1155

TOTAL YIELD: 12 kt

FIREBALL DATA:

Time to 1st minimum: NM

Time to 2nd maximum: 174 to 180 msec

Radius at 2nd maximum: NM

Sponsor: LASL

SITE: NTS - Area 7C 37° 05' 41" N 116° 01' 25" W

Site elevation: 4,235 ft

HEIGHT OF BURST: 500 ft

TYPE OF BURST AND PLACEMENT:

Tower burst over Nevada soil

CLOUD TOP HEIGHT: 33,000 ft MSL CLOUD BOTTOM HEIGHT: 23,000 ft MS

CRATER DATA: No crater

#### REMARKS:

The on-site fallout pattern was drawn from ground survey readings made by the Radiological Safety organization using AN/PDR \$3 and AN/PDR 39 survey instruments. The readings were taken at H+7 hrs, D+1 day, D+3 days, D+4 days, and D+7 days along eight radial roads in order to determine radiation exclusion areas. The t-1.2 decay approximation was used to extrapolate the dose-rate readings to H+1 hour. The reliability of the extrapolated dose-rate readings is questionable because of the uncertainty in decay rates.

The off-site fallout pattern was analyzed by Program 37 of UCLA. Actual decay data were used to plot the H+12 hour dose-rate contours. The t-1-3 decay approximation was used by NDL to extrapolate the dose-rate readings to H+1 hour. The dashed lines show the estimated shape of the iso-intensity contours from GZ to the location of the closest measurement. The 2 r/hr "hot spot", some 70 miles downwind of GZ, was located immediately downwind of a mountain range and rain was reported in the general vicinity at the time the fallout occurred.

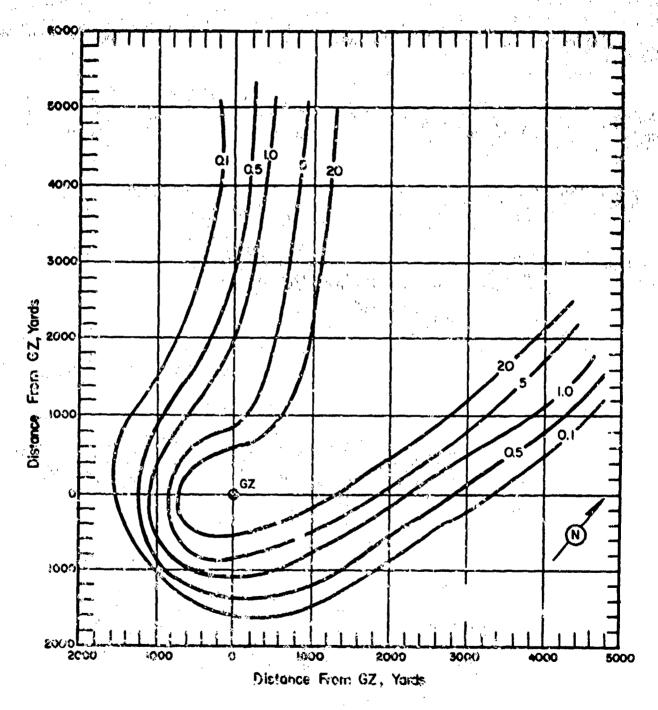


Figure 168. Operation PLUMBBOB - Doltzmann.
On-site dose rate contours in r/mr at H+1 hour.

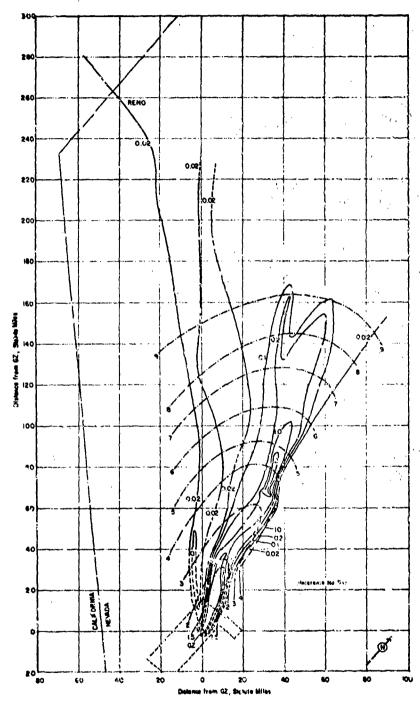


Figure 169. Operation PLUMBBOB - Boltzmann. Off-site dose rate contours in r/hr at H+1 hour.

TABLE 47 NEVADA WIND DATA FOR OPERATION FLUMBIOR

7 A	· · · · · · · · · · · · · · · · · · ·								
Altitude	H-he	our	H+3 hours		Altitude	II-hour		H+2 heurs	
(MSL)	Dir	Speed	Dir	Specc	(MSL)	Dir	ිpeeu	Mr	Speed
feet	dugrees	mph	dégrees	mph	feet	degrees	mon	degrees	mch
Surface	Calm	(e)m	120	02	28,000	160	23		<b>+-</b>
5,000	Calm	Calm	130	05	29,000	170	23		
6,000	Calm	Calm	1.40	07	30,000	170	24	160	25
7,000	Calm	Calm	140	Q <u>\$</u>	31,000	180	25		
8,000	200	12	150	. 08	32,000	180	26		
9,000	130	13	150	14	33,000	180	26		
10,000	150	15	11.0	15	34,000	180	:25	,,	
11,000	140	17	***		35,000	190	ટ્રેક	1.90	38
12,000	140	i8 -	150	16	36,000	190	46		
13,000	3.40	29			37,000	200	51		
14,000	130	21	1.30	23	38,000	220	47		
15,000	£30 .	24	(150)	(29)	39,000	220	53	11 mag	
16,000	7/10	31	140	36	40,00C	220	54	370	61
17,000 .	140	29			41,000	550	55		••
18,000	340	31	160	35	42,000	210	61		
19,000	140	30 -			43,000	210	52		
20,000	150	28	130	29	44,000	210	45		
21,000	160	25			45,000	230	52	220	145
22,000	160	23			46,000	240	46		
23,000	170	23	150	ક્લ	47,000	240	59	;	~-
24,000	170	. 21		4 -	48,00a	230	3ú		
25,000	170	21	160	26	49,000	230	32		
26,000	170	21			50,000	230	33	220	32
27,000	17C	23			51,000	230	38	~	

- 1. Numbers in parentheses are estimated values.
- Wind data was obtained from the Yucca weather station.
   Tropopause height was 41,000 ft MSL.
- 4. At H-hour the surface air pressure was 868 mb, the temperature 18.1°C, the dew point 4.5°C and the relative humidity 41%.

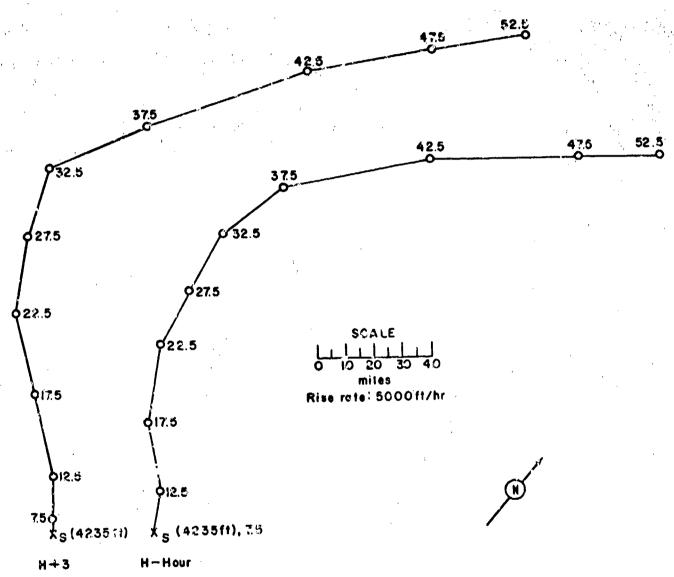


Figure 170. Rodographs for Operation PLUMBBOB

- Bollzmann.

#### Franklin

 PDT
 GMT

 DATE:
 2 Jun 1957
 2 Jun 1957

 TIME:
 0455
 1155

TOTAL YIELD: 140 tons

FIREBLE, DATA:

Time to 1st minimum: NM

Time to 2nd maximum: NM

Radius at 2nd maximum: NM

Sponsor: LASL

SITE: NTS - Area 3 37° 02' 52" N 116° 01' 16" W Site elevation: 4,026 ft

HEIGHT OF BURST: 300 ft

TYPE OF BURST AND PLACEMENT:
Tower burst over Nevada soil

CLOUD TOP HEIGHT: 16,700 ft CLOUD BOTTOM HEIGHT: 14,000 ft

CRATER DATA: No crater

### REMARKS:

The pattern was eleained from ground-survey readings of the Radiological Safety Division of Reynolds Electrical and Engineering Co., Inc., using AN/PIR \$3 and AN/PDR 39 survey instruments. The readings were taken at H+1 hour and D+1 day along eight radial lines in order to determine radiation exclusion areas. The dose-rate readings were extrapolated to H+1 hour using actual dose-rate decay data

No off-site fallout was observed.

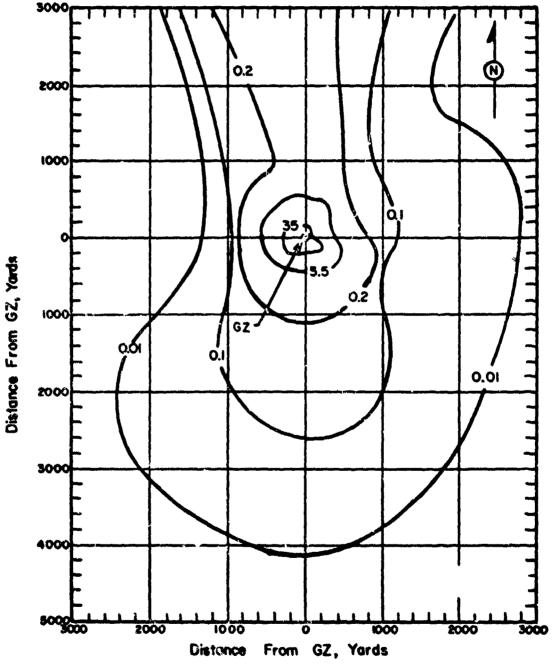


Figure 171. Operation PLUMBBOB - Franklin On-site dose rate contours in r/hr at H+l hour.

TABLE 48 NEVARA WIND DATA FOR OPERATION PLUMBBOB -

FRANKLIN

Altitude	H+) }	our	H+3 F	ours
(MSL)	Dir	Speed	Dir	Speed
feet	degrees	mph	degrees	mph
Surface	Calm	Calm	Calm	Calm
5,000	Ca lm	Calm	Calm	Calm
6,000	Ca lm	Calm	Ca lm	Calm
7,000	Calm	Calm	Calm	Calm
8,000	Calm	Calm	150	02
9,000	Calm	Calm	150	06
10,000	Calm	Calm	150	07
11,000	Calm	Calm		
12,000	130	80	160	07
13,000	130	09		
14,000	120	07	160	07
15,000	120	07	(220)	(06)
16,000	180	07	280	05
17,000	040	03		
18,000	310	09	Calm	Calm
19,000	310	09		
20,000	310	07	$\mathtt{Calm}$	Calm
21,000	310	09		
22,000	270	07	~ - **	
23,000	230	09	$\mathtt{Calm}$	Calm
24,000	230	13		
25,000	230	16	Calm	Calm
<b>3</b> 0,000	290	07	280	12
35,000	300	09	300	16
40,000	300	23	320	21
45,000	320	31	310	26
50,000	280	24	290	31

#### NOTES .

- 1. Numbers in parentheses are estimated values.
- 2. Wind data was obtained from the Yucca weather station.
- 3. At the surface the air pressure was 878 mb, the temperature 14.0°C, the dew point 3.0°C, and the relative humidity 47%.



Rise rate: 5000ft/hr

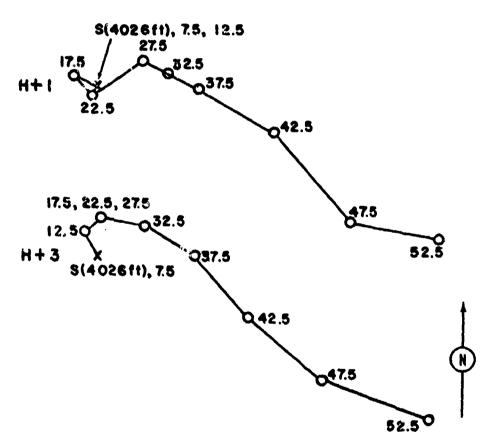


Figure 172. Hodographs for Operation PLUMBBOB-

Franklin.

Lassen

PDT GMT

DATE: 5 Jun 1957 5 Jun 1957

TIME: 0445 1145

TOTAL YIELD: 0.5 tons

FIREBALL DATA:

Time to 1st minimum: NM
Time to 2nd maximum: NM
Radius to 2nd maximum: NM

CRATER DATA: No crater

Sponsor: UCRL

SITE: NTS - Area 9a 37° 08' 05" N 116° 02' 27" W Site elevation: 4,230 ft

HEIGHT OF BURST: 500 ft

TYPE OF BURST AND PLACEMENT:
Air burst from balloon over
Nevada soil

CLOUD TOP HEIGHT: 6,600 ft CLOUD BOTTOM HEIGHT: NM

# REMARKS:

The activity is primarily induced activity. The on-site pattern was obtained from H+1 hour ground survey readings of the Radiological Safety Division of Reynolds Electrical and Engineering Co., Inc., using AN/PDR-43 and AN/PDR-30 survey instruments. No decay corrections were necessary. The pattern is fairly reliable.

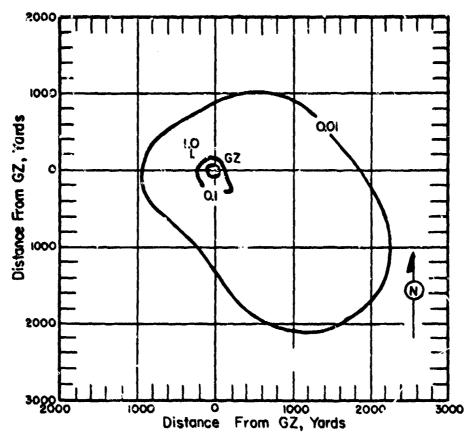


Figure 173. Operation PLUMBBOB - Lassen. On-site dose rate contours in r/hr at H+1 hour.

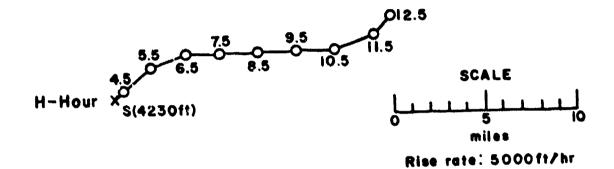
TABLE 49 NEVADA WIND DATA FOR OPERATION PLUMBBOB-

LASSEN

Altitude	H-hou	r	H+25 hc	urs
(MSL)	Dir	Speed	Dir	Speed
feet	degrees	mph	degrees	mph
Surface	Calm	Calm	Calm	Calm
4,700	230	06		
5,000	230	09	330	08
6,000	250	09	300	12
7,000	270	09	250	16
8,000	270	09	250	18
9,000	270	09	290	21
10,000	270	09	290	23
11,000	250	10	(295)	(37)
12,000	220	05	300	31
13,000	230	09	-	
14,000	240	80	280	21
15,000	230	07		
16,000	200	07	260	20
17,000	180	07		
18,000	200	07	230	23
19,000	200	10		
20,000	210	17	550	21
21,000	220	17		
22,000	550	17		~-
23,000	550	15	210	23
24,000	550	16		~=.
25,000	510	18	500	23
30,000	240	14		
35,000	260	18		~-
40,000	250	26		• •
45,000	300	29		~ ~
50,000	300	24		

# NOTES:

- 1. Numbers in parentheses are estimated values.
- Tropopause height was 42,618 ft MSL at H-hour.
- 3. Wind Data was obtained from the Yucca weather station.
  4. At H+1 hour the surface air pressure was 873 mb the to At H+1 hour the surface air pressure was 873 mb, the temperature 23.3°C, the dew point 9.5°C and the relative humidity 40%.



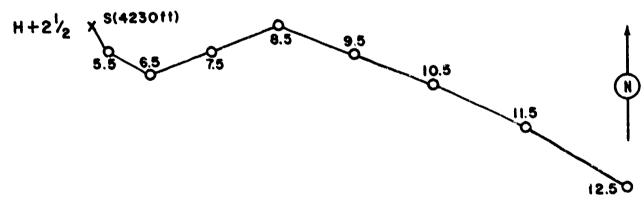


Figure 174. Hodographs for Operation PLUMBBOB

W11301.

PDT GMT

DATE: 18 Jun 1957 18 Jun 1957

TIME: 0445 1145

TOTAL YIELD: 10 kt

FIREBALL DATA:

Time to 1st min.: NM
Time to 2nd max.: 133 msec
Radius at 2nd max: NM

CRATER DATA: No crater

Sponsor: UCRL

SITE: NTS - Area 9a 37° 08' 05" N 116' 02' 27" W

Site elevation: 4,230 ft

HEIGHT OF BURST: 500 ft

TYPE OF BURST AND PLACEMENT:

Air burst from balloon over
Nevada soil

CLOUD TOP HEIGHT: 35,000 ft MSL CLOUD BOTTOM HEIGHT: 25,000 ft MSL

### REMARKS:

On-site contamination was primarily due to induced activity. The on-site pattern was obtained from ground survey readings of the Radio-logical Safety Division of Reynolds Electrical and Engineering Co., Inc., using AN/PDR 43 and AN/PDR 39 survey instruments. The readings were taken at H+2 hours, D+1 day, D+2 days and D+3 days along eight radial roads to determine radiation exclusion areas. The dose-rate readings are not reliable because the induced-activity-decay curve is not strictly applicable to a mixture of fission products and induced activities. Decay measurements indicated a decay rate similar to Na<sup>24</sup> for distances out to 1,200 yards from GZ. The off-site fallout was analyzed by Program 37 of UCIA and the USWB Special Projects Section. They used actual decay data to plot the H+12 hour dose-rate contours. The t<sup>-1.2</sup> decay approximation was used by NDL to extrapolate the H+12 hour dose-rate contours to H+1 hour. The times of arrival were estimated from the wind data.

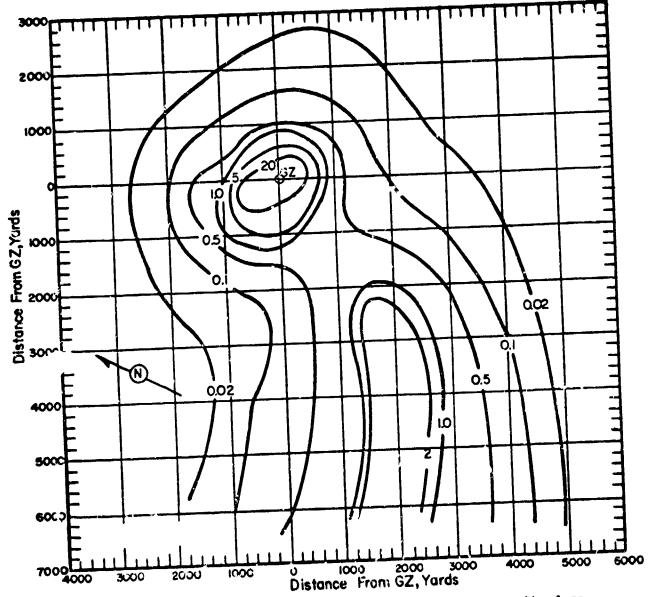
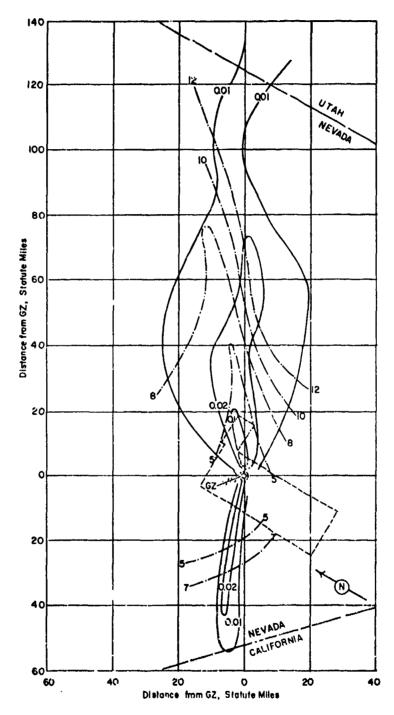


Figure 175. Operation FLUMBBOB - Wilson. On-site dose rate contours in r/hr at H+1 nour.



かられた かんしいがん かから 大地の こうない しゅうしょ なないになる

Figure 176. Operation PLUMBBOB - Wilson. Off-site dose rate contours in r/hr at H+1 hour.

TABLE 50 NEVADA WIND DATA FOR OPERATION PLUMBBOB-

WILSON

Altitude	II-hou	ır	II+3 hours		Altitude	II-hour		H+3 hours	
(MSL)	Dir	Speed	Dir	Speed	(MSL)	Dir	Speed	Dir	Speed
feet	degrees	mph	degrees	mph	feet	degrees	mph	degrees	mph
Surface	340	05	340	02	28,000	220	15		
5,000	030	1.0	010	06	29,000	230	20		*
6,000	060	12	040	09	30,000	5/10	18	220	20
7,000	080	12	060	12	31,000	240	17		
8,000	070	12	070	12	32,000	230	23		
9,000	060	12	060	12	33,000	230	26		
10,000	060	09	060	12	34,000	240	24		
11,000	050	12			35,000	240	22	230	21
12,000	080	09	080	06	36,000	240	22		
13,000	150	05			37,000	240	22		
14,000	310	02	340	08	38,000	240	22		
15,000	300	05	(340)	(80)	39,000	240	22		
16,000	290	02	330	07	40,000	240	24	230	25
17,000	310	09			41,000	230	26		
18,000	290	09	320	10	42,000	240	24		
19,000	260	09			43,000	250	20		
20,000	250	09	280	114	44,000	260	17		
21,000	230	09	~		45,000	260	17	240	28
22,000	220	09			46,000	260	20		
23,000	220	10	220	16	47,000	250	24		
24,C^O	220	13			48,000	250	25		
25,000	550	1,4	220	17	49,000	260	24	^2	
26,000	210	13			50,000	260	21	260	21
27,000	210	12			51,000	260	16	~~~	
					52,000	260	13		
					53,000	260	10		
					54,000	260	1.0		

# NOTES:

- Numbers in parentheses are estimated values.
   Tropopause height was 40,000 ft MSL at H-hour.
- 3. Wind data was obtained from the Yucca weather station.
- 4. At H-hour the surface air pressure was 882 mb, the temperature 17.0°C, the dew point 2.8°C and the relative humidity 38%.

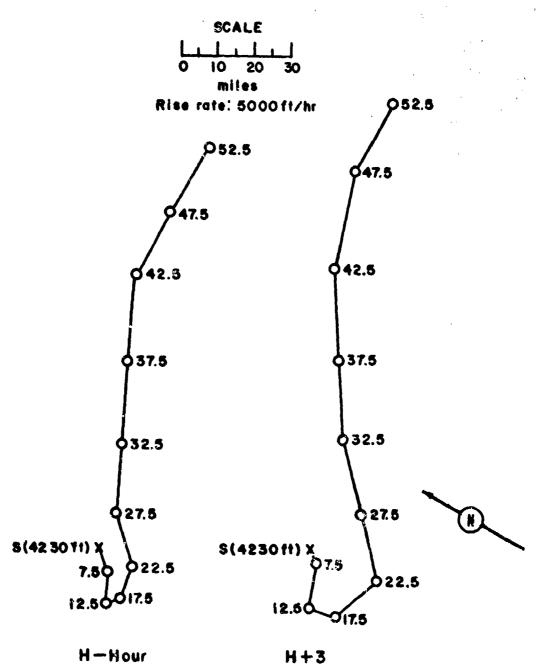


Figure 177. Hodographs for Operation PLUMBBOB

- Wilson.

24 Jun 1957 24 Jun 1957 0630 1330

TOTAL YIELD: 37 kt

FIREBALL DATA:

Time to 1st minimum: Time to 2nd maximum: 202 to 225 msec

Radius at 2nd maximum: NM

CRATER DATA: No crater

Sponsor: LASI - DOD

NTS - Area Frenchman's Flat 37" 17' 53" N 116° 551 44" W Site elevation: 3,076 ft

HEIGHT OF BURST: 700 ft

TYPE OF BURST AND PLACEMENT: Air burst from balloon over Nevada soil

CLOUD TOP HEIGHT: 43,000 ft MSL CLOUD BOTTOM HEIGHT: 24,000 ft MSL

### REMARKS:

On-site contamination was due primarily to induced activities. The on-site dose-rate contours were obtained from ground survey readings of the Radiological Safety Division of Reynolds Electrical and Engineering Co., Inc., and from aerial surveys of a scientific project using AN/PDR 39 and AN/PDR 43 survey instruments. The readings were taken at H+2 hours, H+6 hours, D+1 day, D+2 days and D+3 days along eight radial roads to determine radiation exclusion areas. The induced activity decay curve for Nevada soil was used to extrapolate the dose rate readings to H+1 hour. The dose-rate readings are not reliable because the induced activity decay curve is not strictly applicable to a mixture of fission products and induced activities. Decay measurements indicated a decay rate similar to Na24 for distances out to 1,200 yards from ground zero.

The off-site fallout was analyzed by Program 37 of UCLA and the USWB Special Projects Section. They used actual decay data to plot the H+12 hour dose-rate contours. The t-1.2 decay approximation was used by NDL to extrapolate the H+12 hour dose-rate contours to H+1 hour. The intensity contours are based on ground and aerial survey data, but the shapes of the close-in contours were estimated due to lack of data. The estimation of time of arrival was done by using measured arrival times at known points

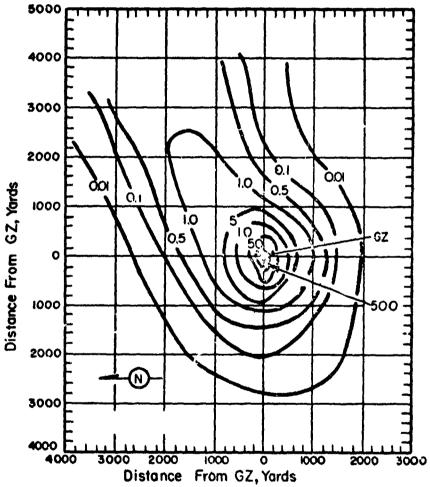


Figure 178. Operation PLUMBBOB - Priscilla. On-site dose rate contours in r/hr at H+l hour.

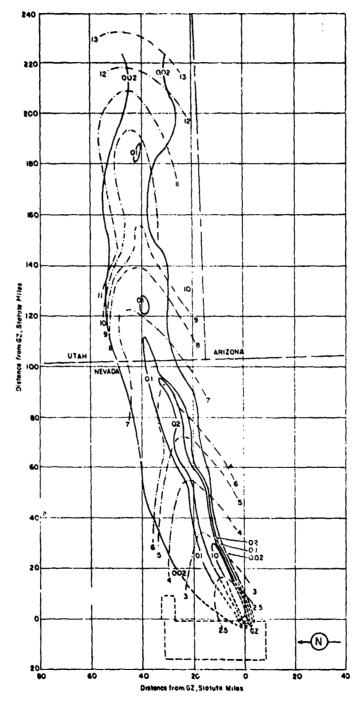


Figure 179. Operation PLUMBBOB - Priscilla. Off-site dose rate contours in r/hr at H+l hour.

TABLE 51 NEVADA WIND DATA FOR OPERATION PLUMBBOB-

PRISCILLA

Altitude	H+1 h		H+4 hours		Altitude	H+1 h		H+14 hours	
(MSL)		Speed	Dir	Speed	_(MSL)	Dir	Speed	Dir	Speed
feet	degreas	mph	degrees	mph	feet	degrees	mph	degrees	mph
Surface	Calm	Calm	180	05	29,000	250	20		
4,000	Calm	Calm	180	09	30,000	250	20	250	15
5,000	220	03	190	09	31,000	250	18		
6,000	220	07	210	09	32,000	260	16		
7,000	220	07	229	07	33,000	280	12	-,	
8,000	230	09	220	07	34,000	260	15		
9,000	240	09	210	07	35,000	240	15	250	14
10,000	230	09	210	80	36,000	240	20		
11,000	230	07			37,000	240	23		
12,000	230	08	240	07	38,000	240	26		
13,000	210	09			39,000	240	32		
14,000	210	80	240	05	40,000	250	41	260	52
000رز1	220	07	(250)	(06)	41,000	260	46		
16,000	240	80	260	07	42,000	260	49		
17,000	260	15			43,000	260	51		
18,000	250	13	240	16	44,000	250	51		
20,000	260	09	240	14	45,000	250	52	250	60
21,000	250	06 '		,	46,000	260	51	*1 mm um	
22,000	230	05			47,000	260	48		
23,000	5/10	05	230	14	48,000	260	46		
24,000	250	80			49,000	260	45		
25,000	250	09	240	16	50,000	<u> </u>	40	270	40
26,000	250	10			51,000	270	29		
27,000	250	16			52,000	270	29		
28,000	250	17			5 <b>3</b> ,000	270	29		• •
					54,655	270	29		

# NOTES:

<sup>1.</sup> Numbers in parentheses are estimated values.

<sup>2.</sup> Tropopause height was 49,212 ft MSL at H-hour.

<sup>3.</sup> Wind data was obtained from rawinsonde observations at the Yucca Weather Station and this data was supplemented by observations below 5,100 ft MSL over ground zero.

<sup>4.</sup> At H-hour the surface air pressure was 909.5 mb, the temperature 17.5  $\pm$  1°C, the dew point -0.6°C and the relative humidity 29%.

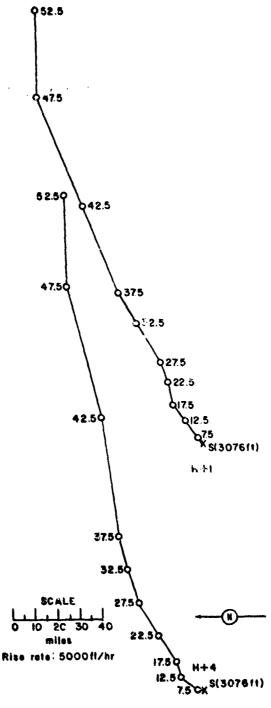


Figure 180. Hodographs for Operation PLUMBBOB

- Priscilla.

# OPERATION PLUMBBOB - Coulomb A Safety Experiment

DATE: 1 Jul 1957 1 Jul 1957

TIME: 1030 1730

SITE: MTS - Area 3 H 37° 02' 30" N

Sponsor: LASL

37° 02' 30" N 116° 01' 33" W

Site elevation:  $\sim 4,000$  ft

HEIGHT OF BURST: Surface.

TYPE OF BURST AND PLACEMENT:
Surface burst on Nevada soil

CLOUD TOP HEIGHT: 1,000 ft
CLOUD BCTTOM HEIGHT: NM

# REMARKS:

An extensive alpha survey was carried out in the area within a 50-yard radius of ground zero. A general level of  $15,000 \text{ c/m/}55 \text{ cm}^2$  was detected in this area

Hood

PDT GMT
5 Jul 1957 5 Jul 1957

IME: 0440 1140

TOTAL YIELD: 74 kt

FIREBALL DATA:

DATE:

Time to 1st minimum: NM

Time to 2nd maximum: 276 to 280 msec

Radius at 2nd maximum: NM

CRATER DATA: No Crater

Sponsor: UCRL

SITE: NTS - Area 9a

37° 08' 05" N 116° 02' 27" W

Site elevation: 4,230 ft

HEIGHT OF BURST: 500 ft

TYPE OF BURST AND PLACEMENT:

Air burst from balloon over
Nevada soil

CLOUD TOP HEIGHT: 48,000 ft MSL CLOUD BOTTOM HEIGHT: 35,000 ft MSL

#### REMARKS:

On-site contamination was due primarily to induced activities. The on-site dose rate contours were obtained from ground survey readings of the Radiological Safety Division of Reynolds Electrical and Engineering Company, Inc., using AN/PDR 39 and AN/PDR 43 survey instruments. The readings were taken at H+1 hour, H+6 hours, D+1 day, D+2 days and D+3 days. The neutron induced-activity-decay curve for Nevada soil

was used to extrapolate the dose-rate readings to H+l hour. Few readings were taken to the north and east of ground zero because of rough terrain and numerous brush fires ignited by the detonation. The off-site fallout was analyzed by Program 37 of UCLA and the USWB Special Projects Section. They used actual decay data to plot the H+l2 hour dose-rate contours. The t-1.2 decay approximation was used by NDL to extrapolate the H+l2 hour dose-rate contours to H+l hour. The fallout pattern is based on ground and aerial survey data.

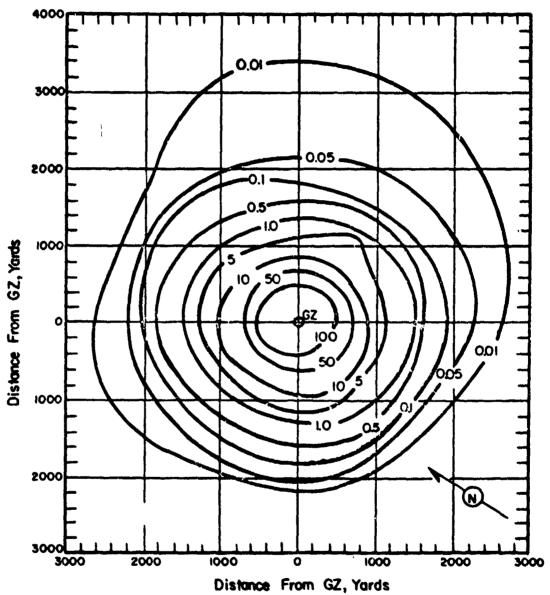


Figure 181. Operation PLUMBBOB - Hood. On-site dose rate contours in r/hr at H+1 hour.

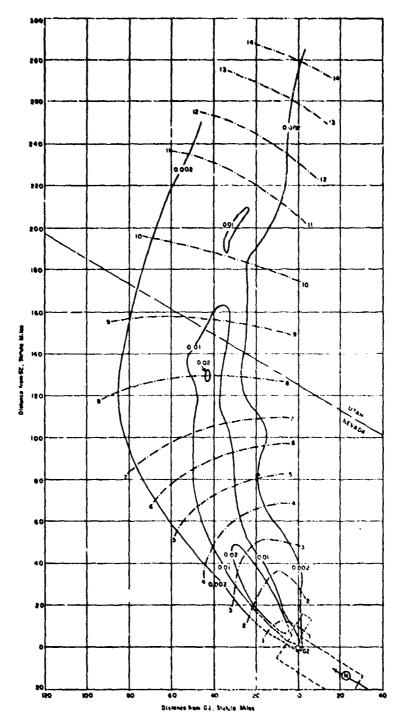


Figure 182. Operation PLUMBBOB - Hood. Off-site dose rate contours in r/hr at H+l hour.

TABLE 52 NEVADA WIND DATA FOR OPERATION PLUMBBOB.

Altitude	H-hou	r	Altitude	II-hou		
(MSL)	Dir	Speed	(MSL)	Dir	Speed	
feet	degrees	mph	feet	degrees	mph	
Surface	Calm	Calm	29,000	200	18	
5,000	320	02	30,000	200	20	
6,000	200	05	31,000	200	24	
7,000	200	08	32,000	210	26	
8,000	180	09	33,000	210	31	
9,000	170	12	34,000	220	21	
10,000	160	15	35,000	230	22	
12,000	150	14	36,000	220	25	
13,000	160	17	37,000	210	24	
14,000	170	23	38,000	210	23	
15,000	180	30	39,000	510	25	
16,000	180	33	40,000	210	26	
17,000	180	33	41,000	510	26	
18,000	180	24	42,000	510	28	
19,000	180	17	43,000	550	32	
20,000	180	12	44,000	220	36	
21,000	510	09	45,000	220	39	
22,000	220	09	46,000	220	39	
23,000	550	12	47,000	550	38	
24,000	230	13	48,000	530	36	
25,000	230	10	49,000	230	35	
26,000	220	10	5 <b>0,</b> 000	230	28	
27,000	190	12	51,000	230	23	
28,000	190	14	52,000	230	55	
•			53,000	220	55	
			54,000	230	22	

# NOTES:

1. Tropopause height was 53,149 ft MSL at H-hour.

Wind data was obtained from the Yucca weather station.
 At H-hour, the surface air pressure was 876 mb, the temperature 21.0°C, the dew point -3.3°C and the relative humidity 19%.

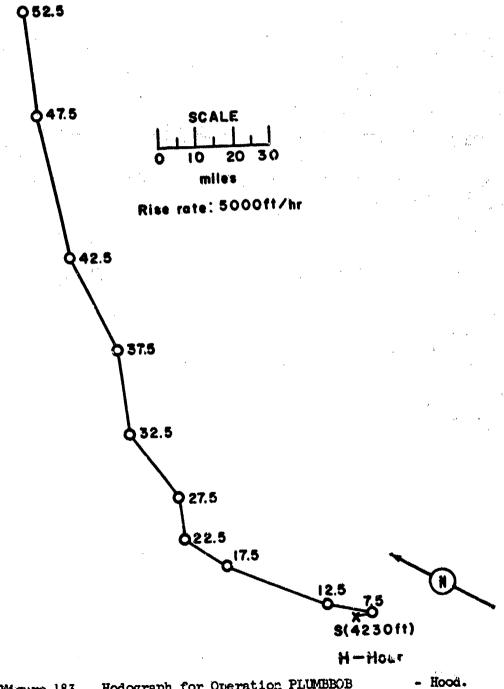


Figure 183. Hodograph for Operation PLUMBBOB

Diablo

PDT GMT

DATE: 15 Jul 1957 15 Jul 1957

TIME: 0430 1130

TOTAL YIELD: 17 kt

FIREBALL DATA:

Time to 1st minimum: NM

Time to 2nd maximum: 250 to 265 msec

Radius of 2nd maximum: NM

CRATER DATA: No crater

Sponsor: UCRL

SITE: NTS - Area 2b 37° 09' 01" N

116° 06' 31" W

Site elevation: 4,469 ft

HEIGHT OF BURST: 500 ft

TYPE OF BURST AND PLACEMENT:
Tower burst over Nevada soil

CLOUD TOP HEIGHT: 32,000 ft MSI.
CLOUD BOTTOM HEIGHT: 20,000 ft MSL

## REMARKS:

No on-site fallout pattern was obtained from ground survey readings obtained by the Radiological Safety Organization using AN/PDR 39 and AN/PDR 43 survey instruments. The readings were taken along 4 radial roads at H+1 hour and along 6 radial roads at H+7 hours, D+1 day, D+2 days, D+3 days, and D+4 days. The t-1.2 decay approximation was used by NDL to extrapolate the dose-rate readings to H+1 hour.

The off-site fallout was analyzed by program 37 of UCLA. Actual decay data were used to plot the H+12-hour dose-rate contours. The t-1.2 decay approximation was used by NEL to extrapolate the H+12-hour dose-rate readings to H+1 hour. "The shape of the fallout pattern on the western edge was estimated and may be too far to the west. The lack of roads and bad ground features procluded the collection of data in this area. Arrival times after six hours were estimated on the basis of the measured arrival times and the use of calculated trajectories"

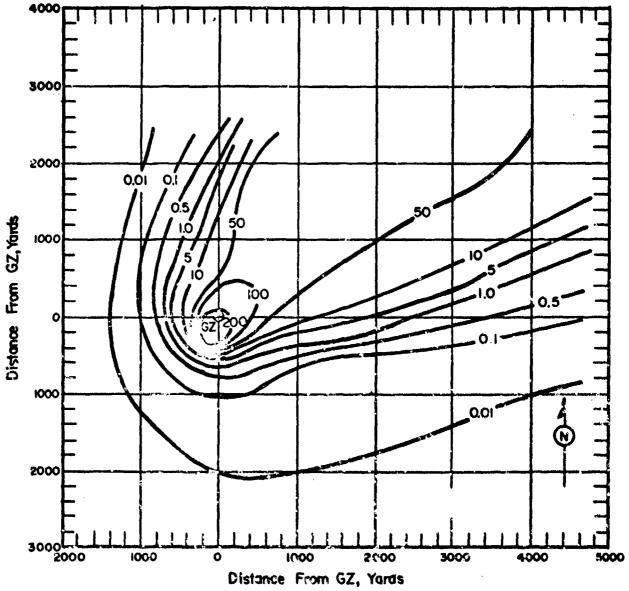


Figure 184. Operation PLUMBBOB - Diablo.
On-site dose rate contours in x/hr at H+1 hour.

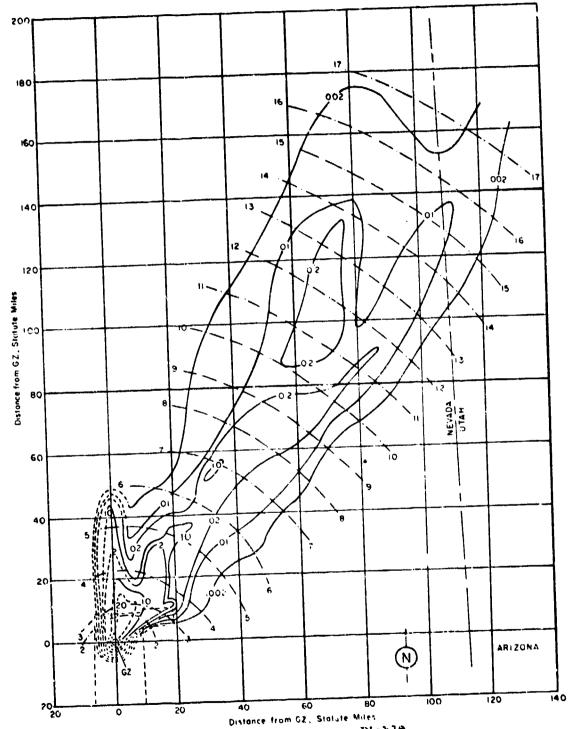


Figure 185. Operation PLUMBBOB - Diablo.
Off-site dose rate contours in r/hr at H+l hour.

TABLE 53 NEVADA WIND DATA FOR OPERATION PLUMBBOB-

DIABLO

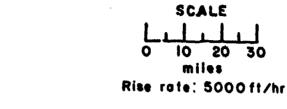
Altitude	H-hou	r	H+3 hor	ırs	Altitude	H-ho	ır	H+3 hor	ırs
(MSL)	Dir	Speed	Dir	Speed	(MSL)	Dir	Speed	Dir	Speed
feet	degrees	mph	degrees	mph	feet	degrees	mph	degrees	mph
Surface	Calm	Calm	Calm	Calm	30,000	280	10	250	06
5,000	220	0 <u>5</u>	210	02	31,000	290	13		
6,000	220	07	200	06	32,000	290	14		
7,000	220	80	190	07	33,000	290	14		
8,000	220	10	180	06	34,000	290	14		
9,000	220	08	160	10	35,000	280	14	270	20
10,000	200	07	160	10	36,000	270	16		
11,000	170	07			37,000	270	17		
12,000	190	07	180	09	38,000	260	17		
13,000	200	07			39,000	260	17		
14,000	210	09	210	13	40,000	260	17	240	16
15,000	220	09	(220)	(10)	41,000	260	16		
16,000	510	77	230	08	42,000	260	14		
17,000	210	07		~-	43,000	240	14		
18,000	510	07	210	10	44,000	220	14		
19,000	230	07			45,000	230	16	<b>25</b> 0	16
20,000	250	09	230	09	46,000	240	18		
21,000	270	09			47,000	260	22		
22,000	280	08			48,000	250	21		
23,000	290	07	<b>28</b> 0	7'C	49,000	260	18		
24,000	300	07		-	50,000	260	15	240	80
25,000	300	12	290	05	51,000	260	12		
26,000	300	14			52,000	210	07		
27,000	300	13			53,000	190	07		
28,000	300	12	~	-		•	•		
29,000	290	. 12	'						

<sup>1.</sup> Numbers in parentheses are estimated values.

<sup>2.</sup> Tropopause height was 43,000 ft MSL at H-hour.

<sup>3.</sup> Wind data was obtained from the Yucca weather station.

<sup>4.</sup> At H-hour the surface air pressure was 864 mb, the temperature 23.1°C, the dew point -0.8°C and the relative humidity 20%.



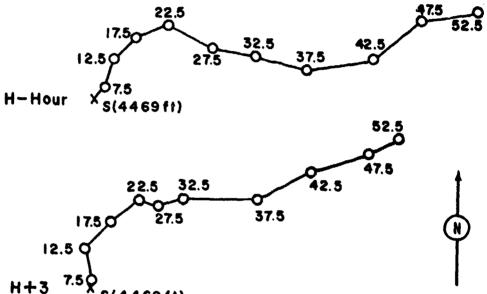


Figure 186. Hodographs for Operation PLUMBHOB

- Diablo.

John

PDT

CMT

19 July 1957

19 July 1957

TIME: 0700

1400

TOTAL YIELD: -2 kt

FIREBALL DATA:

Time to 1st minimum: NM

Time to 2nd maximum: 46 to 55 msec

Radius at 2nd maximum: NM

CRATER DATA: No crater

Sponsor: DOD

SITE: NTS - Area 10

37° 09' 38" N 116° 03' 11" W

Site elevation: 4,290 ft

HEIGHT OF BURST: 20,000 ft

TYPE OF BURST AND PLACEMENT:

Air burst from rocket over

Nevada soil

CLOUD TOP HEIGHT: 44,000 ft MSL CLOUD BOTTOM HEIGHT: NM

REMARKS: No local fallout.

TABLE 54 NEVADA WIND DATA FOR OPERATION PLUMBIOB-

JOIN

Altitude	II-ho	our	H+l+ hor	H+4 hours		H-hou	ır	H+4 hou	ire
(MSL)	Dir	Speed	Dir	Speed	(MSL)	Dir	Speed	Dir	Speed
feet	degrees	mph	degrees	mph	feet	degrees	mph	degrees	mph
Surface	Calm	Calm	180	14	29,000	200	24		
5,000	180	09	190	16	30,000	190	24	190	33
6,000	180	12	200	20	31,000	180	26		
7,000	190	21.	200	<b>2</b> 0	32,000	190	29		
8,000	180	24	190	20	33,000	500	32		
9,000	180	24	190	20	34,000	190	26		••
10,000	1.80	24	180	20	35,000	190	44	510	44
11,000	180	28			36,000	190	48		
12,000	170	16	180	25	37,000	190	43		
13,000	180	15			38,000	200	49		
14,000	180	15	200	29	39,000	500	52		
15,000	190	15	(200)	(29)	40,000	200	55	200	50
16,000	190	17	200	29	41,000	200	54		
17,000	200	17			42,000	200	54		
18,000	200	18	210	25	43,000	190	56		
19,000	210	16			44,000	200	5h		
20,000	210	17	220	22	45,000	220	48	210	32
21,000	210	17			46,000	550	42		
22,000	210	20			47,000	220	36		
23,000	210	22	220	22	48,000	220	35		
24,000	200	22			49,000	210	33	40 Tr. 16	
25,000	200	21	200	21	50,000	210	35	210	33
26,000	200	21			51,000	210	36	-	
27,000	190	55			52,000	210	29		•-
28,000	190	23			53,000	500	25		

Numbers in parentheses are estimated values.
 Tropopause height was 47,500 ft MSL at H-hour.

<sup>3.</sup> Wind data was obtained from the Yucca weather station.
4. At H-hour, the surface air pressure was 868 mb, the temperature 22.1°C, the dew point 1.3°C and the relative humidity 25%.

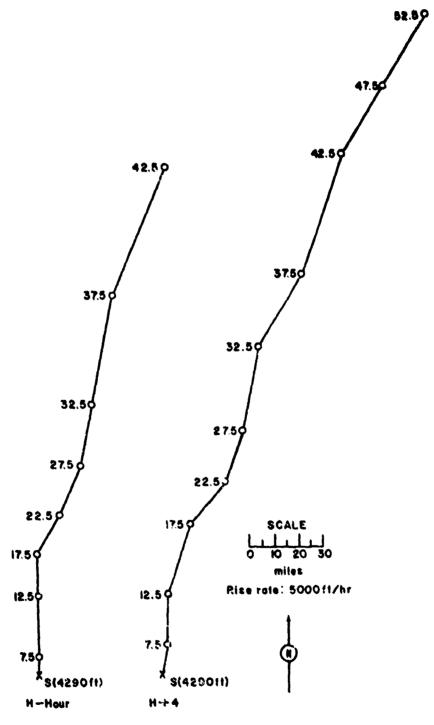


Figure 187. Hodographs for Operation PLUMBBOB

- John.

Kepler

PDT CMT

DATE: 24 July 1957 24 July 1957

TIME: 0450 1150

TME: 0450 1150

TOTAL YIELD: 10 kt

FIREBALL DATA:

Time to 1st minimum: NM
Time to 2nd maximum: 62 msec
Radius at 2nd maximum: NM

CRATER DATA: No crater

Sponsor: LASL

SITE: NTS - Area 4 37° 05' N

116° 06' W

Site elevation: 4,309 ft

HEIGHT OF BURST: 500 ft

TYPE OF BURST AND PLACEMENT:
Tower burst over Nevada soil

CLOUD TOP HEIGHT: 28,000 ft MSL CLOUD BOTTOM HEIGHT: 20,000 ft MSL

#### REMARKS:

The on-site fallout pattern was obtained from ground survey readings of the Radiological Safety Division of Reynolds Electrical and Engineering Co., Inc., using AN/PDR 39 and AN/PDR 43 survey instruments. The readings were taken at H+6 hours. D+1 day, D+2 days, D+3 days, and D+5 days along eight radial roads to determine radiation exclusion areas. The reliability of the extrapolated dose-rate readings is questionable because of the uncertainty in decay rates. The t-1.2 decay approximation was used to extrapolate the dose-rate readings to H+1 hour.

The off-site fallout was analyzed by the USWB Special Projects Section. The  $t^{-1\cdot 2}$  decay approximation was used to extrapolate the dose-rate readings to H+1 hour. The fallout pattern is not reliable. There were discrepancies in the several monitor runs.

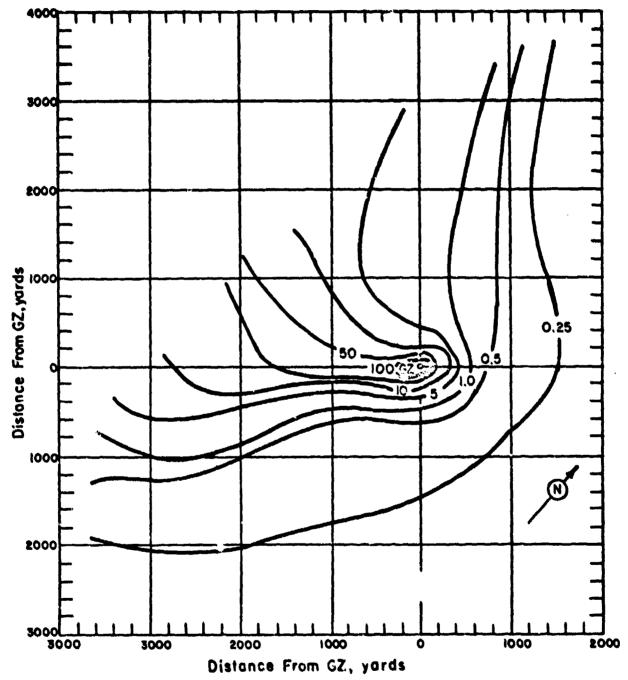


Figure 188. Operation PLUMRBOB - Kepler.
On-site dose rate contours in r/hr at H+1 hour.

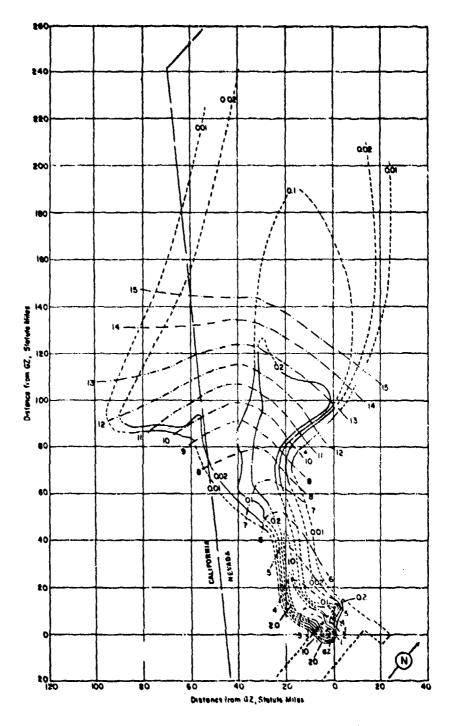


Figure 189. Operation PLUMBBOB - Kepler.
Off-site dose rate contours in r/hr at H+1 hour.

TABLE 55 NEVADA WIND DATA FOR OPERATION PLUMBBOB-

KEPLER

Altitude	H-hour		11+6 hours		Altitude	H-hour		H+6 hours	
(MSI.)	Dir	Speed	Dir	Speed	(MSL)	Dir	Speed	Dir	Speed
feet	degrees	mph	degrees	mph	feet	degrees	mph	degrees	mph
Surface	Calm	Calm	110	13	31,000	230	22		
5,000	020	02	120	20	32,000	230	5/1		
6,000	060	07	130	20	33,000	230	24		
7,000	270	03	120	14	34,000	220	25		~-
8,000	150	05	140	07	35,000	220	29	210	33
9,000	170	06	150	10	36,000	220	37		
0,000,	210	06	140	12	37,000	230	39		
11,000	140	07			38,000	230	41		
12,000	070	12	100	08	39,000	220	43		
13,000	100	07			40,000	220	41	210	68
14,000	130	12	110	14	41,000	220	40		
15,000	090	15	(140)	(12)	42,000	210	41		
16,000	090	16	180	09	43,000	210	43		
17,000	080	16			44,000	220	40		
18,000	100	07	500	14	45,000	230	38	230	40
19,000	150	05	~		46,000	230	32		
20,000	230	07	180	09	47,000	230	31		
21,000	230	07			48,000	230	31		
22,000	250	10			49,000	230	31		
23,000	270	14	180	16	50,000	240	28	240	25
24,000	250	09	'		51,000	250	24	~	
25,000	260	10	200	16	52,000	250	20		
26,000	250	12			53,000	260	16		
27,000	230	÷.3			55,000	280	08	200	15
28,000	230	15			· · ·				_
29,000	230	18							
30,000	230	20	200	20					

- 1. Numbers in parentheses are estimated.
- 2. Tropopause height was 33,300 ft MSL at H-hour.
- 3. Wind data was obtained from the Yucca weather station.
  4. At H-hour the surface air pressure was 865 mb, the temperature 21.0°C, the dew point -5.0°C and the relative humidity 22%.

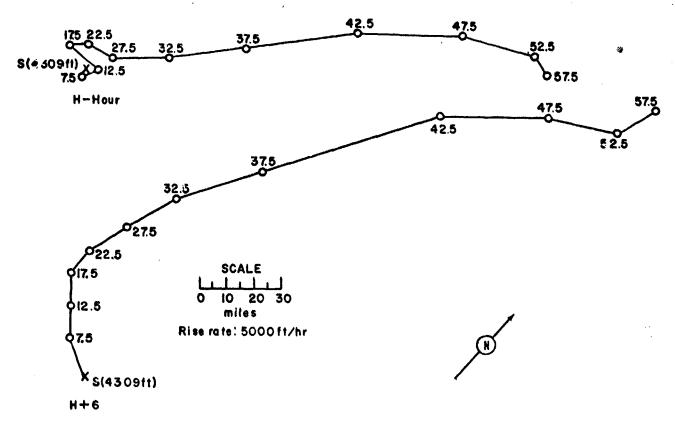


Figure 190. Hodographs for Operation PLUMBBOB - Kepler.

**Owens** 

PDT

DATE: 25 July 1957 2

GMT 25 July 1957

TIME: 0630

1330

TOTAL YIELD: 9.7 kt

Sponsor: UCRL

SITE: NTS - Area 9b 37° 08' 05" N 116° 02' 27" W

Site elevation: 4,215 ft

HEIGHT OF BURST: 500 ft

FIREBALL DATA:

Time to 1st minimum: NM
Time to 2nd maximum: 94 msec
Radius at 2nd maximum: NM

CRATER DATA: No crater

TYPE OF BURST AND FLACEMENT:

Air burst from balloon ever

Nevada soil

CLOUD TOP HEIGHT: 35,000 ft MSL CLOUD BOTTOM HEIGHT: 20,000 ft MSL

### REMARKS:

On-site contamination was due primarily to induced activity. The pattern was obtained from ground survey readings of the Radiological Safety Division of Reynolds Electrical and Engineering Co., Inc., using AN/PDR 39 and AN/PDR 43 survey instruments. The readings were taken at H+1 hour, H+6 hours, D+1 day, D+2 days, D+3 days and D+5 days along eight radial roads to determine radiation exclusion areas. The dose rate readings were extrapolated to H+1 hour by the generalized decay curve for neutron-induced activity in Nevada soil.

The extrapolated dose rates are not very accurate because of uncertainty in decay rates.

The off-site fallout was analyzed by the UEWB Special Projects Section. The t-1.2 decay approximation was used to extrapolate the dose-rate readings to H+1 hour. Most of the pattern attributed to Owens was in an area relatively free from residual contamination. Boltzman debris was to the west and Diablo debris to the east, but only on the fringes of the Owens fallout is there much uncertainty in the analysis. Widely scattered showers occurred throughout most of Nevada on D-day and D+1 day.

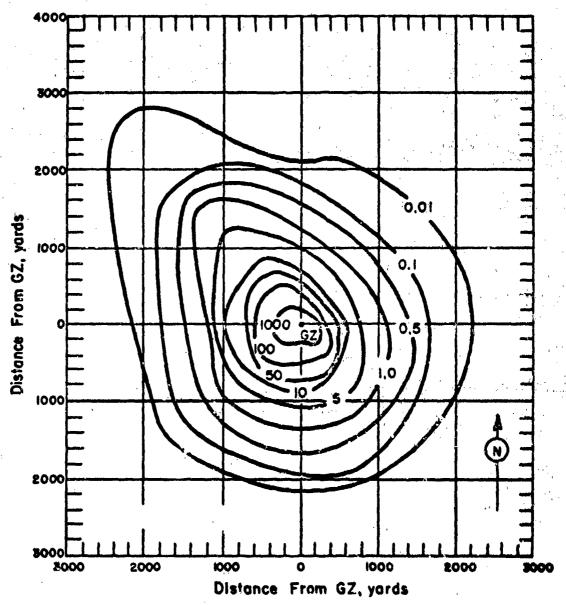


Figure 191. Operation PLUMBBOB - Owens.
On-site dose rate contours in r/hr at H+1 hour.

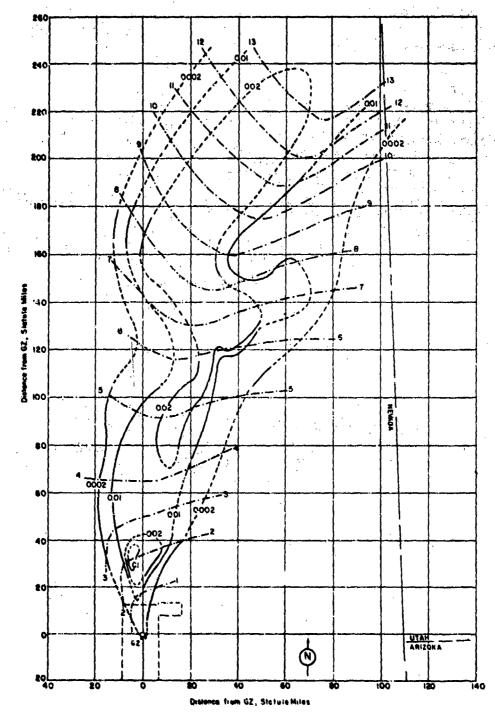


Figure 192. Operation PLUMBBOR - Owens.
Off-site dose rate contours in r/hr at H+l hour.

TABLE 56 NEVADA WIND DATA FOR OPERATION PLUMBBOB-

**OWENS** 

Altitude	H-hou	ır	H+45 hours		Altitude	H-hou	ır	11+45 hours	
(MSL)	Dir	Speed	Dir	Speed	(MSI.)	Dir	Speed	Dir	Speed
ieet	degrees	mph	degrees	mph	feet	degrees	mph	degrees	mph
Surface	Calm	Calm	120	05	30,000	220	35	200	38
5,000	320	03	140	05	31,000	550	26		
6,000	040	04	170	05	32,000	210	32		
7,000	140	06	210	07	33,000	210	35		
8,000	160	80	210	07	34,000	210	38		
9,000	170	14	210	12	35,000	210	40	210	54
10,000	170	16	210	17	36,000	210	53		
11,000	170	20			37,000	210	47		
12,000	070	12	200	29	38,000	220	45		
13,000	170	55	~ ~ ~		39,000	540	51		
14,000	160	55	180	26	40,000	230	43	230	41
15,000	160	23	(180)	(25)	41,000	230	36		
16,000	160	24	170	24	42,000	230	36		
17,000	160	24			43,000	230	37	~	
18,000	170	22	160	24	44,000	230	39		
19,000	170	23			45,000	230	40	220	31
20,000	180	20	180	23	46,000	230	41		
21,000	510	14		~-	47,000	240	41		
22,000	210	15			48,000	240	3 <b>3</b>		
23,000	200	16	180	17	49,000	240	28		
24,000	210	17		~ =	50,000	240	21	500	24
25,000	210	18	200	17	51,000	210	15		
26,000	220	18			52,000	180	09		
27,000	220	20			53,000	170	15		
28,000	220	20			55,000			220	15
29,000	220	20			-				<u> </u>

- Numbers in parentheses are estimated values.
   Tropopause height was 49,300 ft MSL at H-hour.
- 3. Wind data was obtained from the Yucca weather station.
- 4. At H-hour the surface air pressure was 871 mb, the temperature 20.00C, the dew point -3.6°C and the relative humidity 20%.

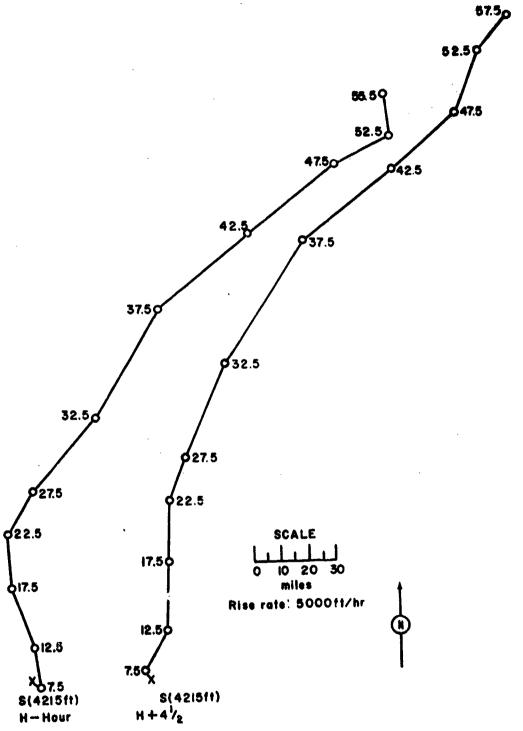


Figure 193. Hodographs for Operation PLUMBBOB - Owens.

## OPERATION PLUMBBOB - Pascal A Safety Experiment

PDT GMT

DATE: 26 July 1957 26 July 1957

TIME: 0100 0800

Sponsor: LASL

SITE: NTS - Area 3J 37° 03' 03" N 116° 01' 56" W

Site elevation: ~ 4,050 ft

HEIGHT OF BURST: -500 ft Underground

CLOUD TOP HEIGHT: 5,500 ft MSL CLOUD BOTTOM HEIGHT: NM

TYPE OF BURST AND PLACEMENT:

Subsurface burst. Partially stemmed well. Device located at the bottom of a cased 200 ft hole with a 50 ft block of concrete above it and an open space up to a heavy concrete cap at the top.

### REMARKS:

The on-site fallout pattern was obtained from ground survey readings of the Radiological Safety Division of Reynolds Electrical and Engineering Co., Inc., using AN/PDR 39 and AN/PDR 43 survey instruments. The readings were taken at H+8 hours, D+1 day, and D+2 days along four radial lines to determine radiation exclusion areas. The t<sup>-1.2</sup> decay approximation was used to extrapolate the dose-rate readings to H+1 hour. The fallout pattern is not reliable because only a few readings were taken. Heavy alpha contamination was detected in a strip about 200 yards wide and 2000 yards long within the 12 r/hr contour.

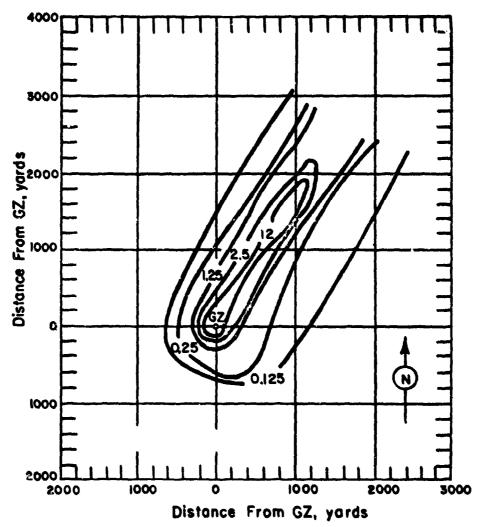


Figure 194. Operation PLUMBBOB - Pascal A. On-site dose rate contours in r/nr at H+l hour.

Stokes

PDT GMT

DATE: 7 Aug 1957 7 Aug 1957

TIME: 0525 1225

TOTAL YIELD: 19 kt

FIREBALL DATA:

Time to 1st minimum: NM
Time to 2nd maximum: 160 msec
Radius at 2nd maximum: NM

CRATER DATA: No crater

Sponsor: LASL

SITE: NTS - Area 7b 37° 05' 12" N 116° 01' 25" W Site elevation: 4,186 ft

HEIGHT OF BURST: 1,500 ft

TYPE OF BURST AND PLACEMENT:
Air burst from balloon over
Nevada soil

CLOUD TOP HEIGHT: 37,000 ft MSL CLOUD BOTTOM HEIGHT: 27,000 ft MSL

#### REMARKS:

On-site contamination was due primarily to induced activity. The pattern was obtained from ground survey readings of the Radiological Safety Division of Reynolds Electrical and Engineering Co., Inc., using AN/PDR 39 and AN/PDR 43 survey instruments. The readings were taken at H+2 hour, H+6 hours, D+1 day, D+2 days D+3 days and D+5 days along radial lines to determine radiation exclusion areas. The dose-rate readings were extrapolated to H+1 hour by the general induced activity decay curve for Nevada soil

The off-site fallout was analyzed by the USWE Special Projects Section. The t-1.2 decay approximation was used to extrapolate the dose-rate readings to H+1 hour. "The fallout pattern attributed to Shot Stokes is on the fringes of fallout from two previous tower bursts (Boltzman and Diablo) and is rather uncertain."

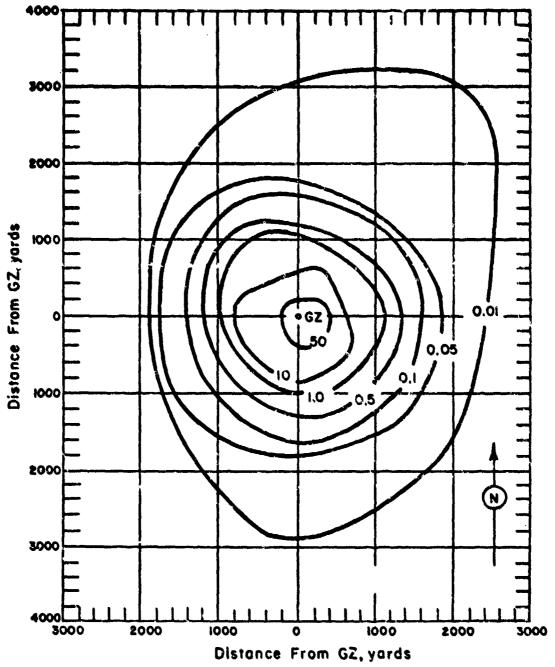


Figure 195. Operation PLUMBBOB - Stokes.
On-site dose rate contours in r/hr at H+l hour.

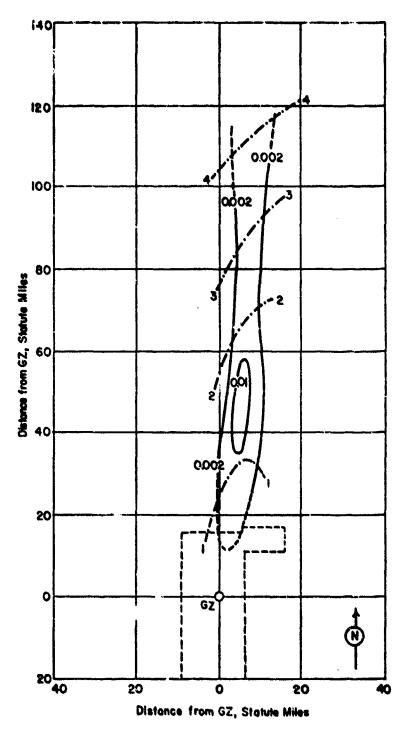


Figure 196. Operation PLUMBBOB - Stokes
Off-site dose rate contours in r/hr at H+l hour.

TABLE 57 NEVADA WIND DATA FOR OPERATION PLUMBBOB-

STOKES

Altitude	H+1 h	our	Altitude	H+1 h	our
(MSL)	Dir	Speed	(MSL)	Dir	Speed
feet	degrees	mph	feet	degrees	mph
Surface	Calm	Calm	29,000	550	72
5,000	200	02	30,000	500	76
6,000	200	06	31,000	500	76
7,000	140	07	32,000	500	76
8,000	100	09	33,000	500	76
9,000	150	07	34,000	<b>23</b> 0	72
10,000	160	09	35,000	500	80
11,000	170	15	36,000	500	79
12,000	180	17	37,000	500	84
13,000	190	<b>3</b> £	38,000	200	98
14,000	190	59	39,000	500	101
15,000	1.80	31	40,000	200	105
16,000	170	38 <sup>-</sup>	41,000	200	87
17,000	180	39	42,000	510	69
18,000	180	71,74	43,000	500	77
19,000	180	46	44,000	200	84
20,000	180	47	45,000	210	75
21,000	180	47	46,000	510	60
22,000	180	53	47,000	<b>51</b> C	59
23,000	180	50	48,000	210	56
24,000	180	51	49,000	210	50
25,000	190	55	50,000	200	43
26,000	190	<u>6</u> 1	54,472	200	28
27,000	200	69			
28,000	200	73			

<sup>1.</sup> Tropopause height was 46,800 ft MSL at H-hour.
2. Wind data was obtained from the Yucca weather station.
3. At H+1 hour the surface air pressure was 870 mb, the temperature 16.8°C, the dew point -4.9°C and the relative humidity 22%.

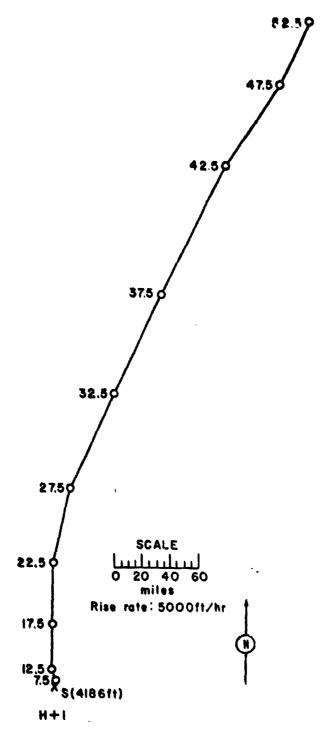


Figure 197. Hodographs for Operation PLUMBBOB -

Stokes.

## OPERATION PLUMBBOB - Saturn Safety Experiment

PDT GMT

DATE: 9 Aug 1957 10 Aug 1957

TIME: 1800 0100

Sponsor: UCRL

SITE: NTS - Area 12-c 37° 11' 38" N 116° 02' 00" W

HEIGHT OF BURST: -128 ft

TYPE OF BURST AND PLACEMENT:
Subsurface burst - Tunnel
in Nevada soil

CLOUD TOP HEIGHT: NM CLOUD BOTTOM HEIGHT: NM

REMARKS:

No fallout.

#### Shasta

 PDT
 GMT

 DATE:
 18 Aug 1957
 18 Aug 1957

 TIME:
 0500
 1200

TOTAL YIELD: 17 kt

FIREBALL DATA:

Time to 1st minimum: NM

Time to 2nd maximum: 220 ± 255 msec

Radius at 2nd maximum: NM

CRATER DATA: No crater

Sponsor: UCRL

SITE: NTS - Area 2a

37° 07' 41" N 116° 06' 23" W

Site elevation: 4,387 ft

HEIGHT OF BURST: 500 ft

TYPE OF BURST AND PLACEMENT:

Tower burst over Nevada soil

CLOUD TOP HEIGHT: 32,000 ft MSL CLOUD BOTTOM HEIGHT: 16,000 ft MSL

#### REMARKS:

The on-site fallout pattern was obtained from ground survey readings of the Radiological Safety Division of Reynolds Electrical and Engineering Co., Inc., using AN/PDR 39 and AN/PDR 43 survey instruments. The readings were taken at H+3 hours, H+6 hours, D+1 day, D+2 days and D+3 days along 6 radial lines to determine radiation exclusion areas. The t-1.2 decay approximation was used to extrapolate the dose rate readings to H+1 hour.

The off-site fallout was analyzed by Program 37 of UCLA and the USWB Special Projects Section. They used actual decay data to plot the H+12 hour dose-rate contours. The t-1.2 decay approximation was used by NDL to extrapolate the H+12 hour dose-rate contours to H+1 hour. Raincut occurred in the Alamo-Hiko, Nevada area as well as in the Lincoln Mine Area. The fallout pattern is the result of the subtraction of Diablo residual activities from measured data. Arrival times after six hours were estimated from the wind data.

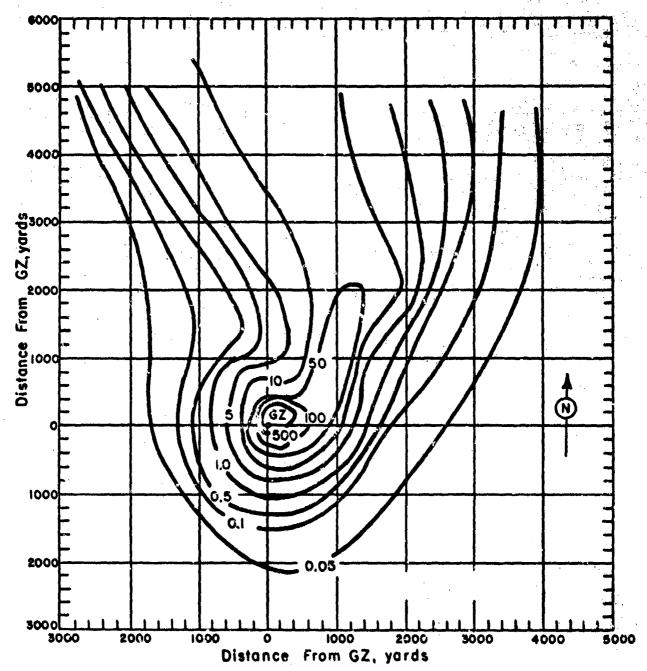


Figure 198. Operation PLUMBBOB - Shasta.
On-site dose rate contours in r/hr at H+1 hour.

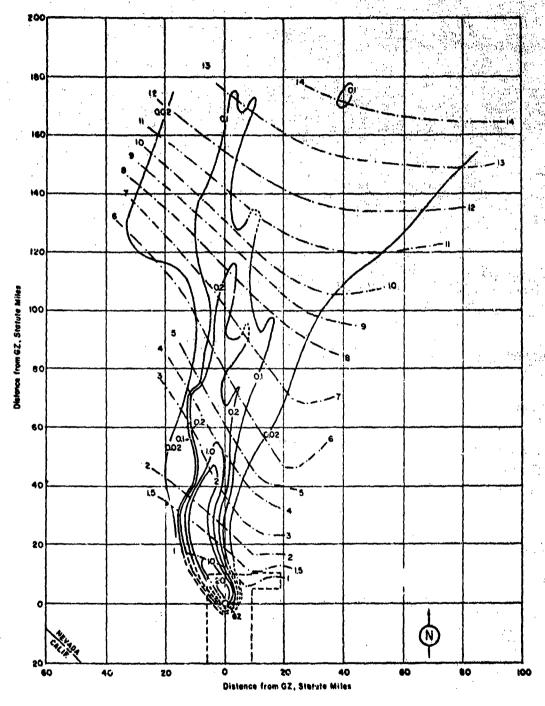


Figure 199. Operation PLUMBBOB - Shasta.
Off-site dose rate contours in r/hr at H+1 hour.

TABLE 58 NEVADA WIND DATA FOR OPERATION PLUMBBOB-

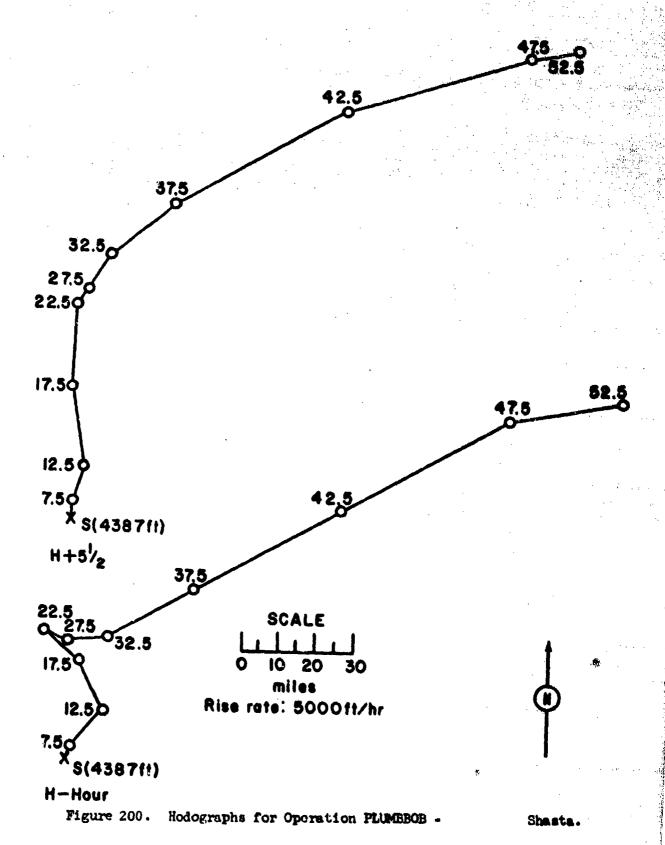
Altitude	H-ho	ir	H+5 1 h	H+5 hours		H-ho	ur	H+55 hours	
(MSL)	Di.r	Speed	Dir	Speed	(MSL)	Dir	Speed	Dir	Specif
feet	degrees	æþh	degrees	mph	feet	degrees	mph	degrees	mph
Surface	Calm	Calm	180	08	30,000	260	10	210	10
5,000	200	05	180	09	31,000	250	14		
6,000	550	10	200	12	32,000	240	17		
7,000	220	14	200	. 12	33,000	240	21		~~
8,000	230	15	210	12	34,000	240	23		
9,000	220	15	210	09	35,000	240	26	230	21
10,000	220	13	190	09	36,000	240	30		
11,000	190	07	~		37,000	240	32		
12,000	150	09	170	16	38,000	240	38		
13,000	140	10	*		39,000	240	41		
14,000	1.40	12	180	16	40,000	240	45	240	53
15,000	150	10	(170)	(21)	41,000	240	50		
16,000	150	14	170	26	42,000	<b>5</b> /rO	53		
17, 00	150	18	41.44.44		43,000	240	54		
18,000	150	. 17	180	28	44,000	240	54	~	
19,000	140	12			45,000	240	52	250	52
20,000	130	. 12	180	21	46,000	250	51		
21,000	150	05			47,000	250	45		
22,000	240	05			48,000	250	41		
23,000	280	07	<sup>7</sup> 180	80	49,000	260 .	. 36		
24,000	300	07			50,000	260	29	260	13
25,000	300	08	510	05	51,000	270	24	~~~	
26,000	300	08			52,000	280	1.8		
27,000	300	07			53,000	300	13		
28,000	290	27					. =		
29,000	270	07		wm		•			

Numbers in parentheses are estimated values.

Tropopause height was 49,800 ft MSI at H-hour.

Wind data was obtained from the Yucca weather station.

At H-hour the surface air pressure was 866 mb, the temperature 26.4°C, the dew point 8.9°C and the relative humidity 33%.



Doppler

PDT 23 Aug 1957 23 Aug 1957

TIME: 0530

DATE:

TOTAL YIELD: 11 kt

FIREBALL DATA:

Time to 1st minimum:

Time to 2nd maximum: 122 to 125 msec

Radius at 2nd maximum: NM

CRATER DATA: No crater

Sponsor: LASL

SITE: MTS - Area 7a

37° 05' 12" 1160 01' 25"

Site elevation: 4,230 ft

HEIGHT OF BURST: 1,500 ft

TYPE OF BURST AND PLACEMENT:

Air burst from balloon over

Nevada soil

CLOUD TOP HEIGHT: 38,000 ft MSL

CLOUD BOTTOM HEIGHT: 23,000 ft MSL

## REMARKS:

The contamination was due primarily to induced activity. The on-site pattern was obtained from ground survey readings of the Radiological Safety Division of Reynolds Electrical and Engineering Co., Inc., using AN/PDR 39 and AN/PDR 43 survey instruments. The readings were taken at H+2 hour, H+6 hours, D+1 day and D+3 days along eight radial roads to determine radiation exclusion areas. The dose-rate readings were extrapolated to H+1 hour by the general induced activity-decay curve for Nevada soil

The off-site fallout was analyzed by the USWB Special Projects Section. The t-1.2 decay approximation was used to extrapolate the dose-rate rendings "Some of the radioactivity is believed to be from Shot Shasta. The pattern interpolated between the burst site and the Nevada Route 38 (approximately 80 miles downwind) can only be a rough approximation in the absence of measurements, but its orientation, at least, is consistent with the wind analysis"

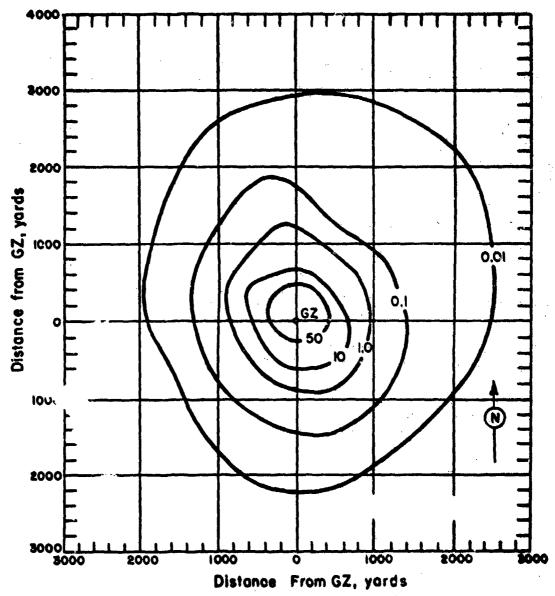


Figure 201. Operation PLUMBBOB - Doppler. On-site dose rate contours in r/hr at H+1 hour.

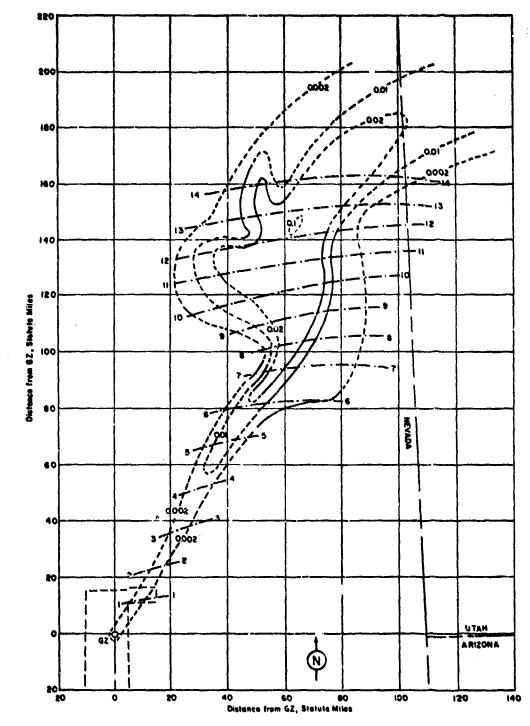


Figure 202. Operation PLUMBBOB - Doppler.
Off-site dose rate contours in r/hr at H+l hour.

TABLE 59 NEVADA WIND DATA FOR OPERATION PLUMBBOB -

DOPPT.ES

Altitude	H-hour		II+3 hours		Altitude	H-ho	our	H+3 hours	
(MSL)	Dir	Speed	Dir	Speed	(MSL)	Dir	Speed	Dir	Speed
feet	degrees	mph	degrees	mph	feet	degrees	mph	degrees	mph
Surface	Calm	Calm	Calm	Calm	29,000	230	50		
5,000	Calm	Calm	Calm	Calm	30,000	230	50	230	43
5,685(BH)	Calm	Calm			31,000	230	50		
6,000	Calm	Calm	Calm	Calm	32,000	210	50		
7,000	220	03	Calm	Calm	33,000	210	- 51		
8,000	220	08	Ca.l.m	Calm	34,000	220	58		
9,000	180	12	080	05	35,000	220	58	220	48
10,000	160	16	130	୦୫	36,000	2.20	58		
11,000	100	20			37,000	550	5 <b>8</b>		
12,000	110	14	150	12	38,000	210	61		
13,000	110	14			39,000	210	63		
14,000	140	12	130	12	40,000	220	65	220	64
15,000	170	09	(160)	(13)	41,000	550	67		
16,000	150	07	160	14	42,000	220	69		
17,000	150	09			43,000	220	68		
18,000	170	07	170	14	44,000	220	66		
19,000	190	07			45,000	550	62	220	56
20,000	200	07	180	1.5	46,000	230	45		
21,000	190	07			47,000	230	45		
22,000	210	07			48,000	2 <u>3</u> 0	45		~~
23,000	200	08	200	15	49,000	230	33		
24,000	200	15		-	50,000	230	17		
25,000	210	21	220	23	51,500	210	10		
26,000	210	23		-	52,000	200	09		
27,000	210	28			53,000	210	13		
28,000	210	35			•				

<sup>1.</sup> Numbers in parentheses are estimated values.

<sup>2.</sup> Tropopause height was 42,800 ft MSL at H-hour.

<sup>3.</sup> Wind data was obtained from the Yucca weather station.

<sup>4.</sup> At H-hour the surface air pressure was 877 mb, the temperature 21.4°C, the dew point 13.9°C and the relative humidity 57%.

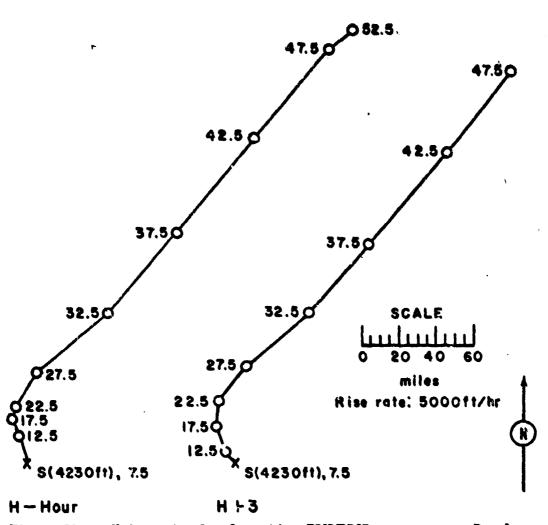


Figure 203. Hodographs for Operation PLUMBBOB - Doppler.

## OPERATION PLUMBBOB - Pascal B Safety Experiment

PDT CMT

DATE: 27 Aug 1957 27 Aug 1957

TIME: 1535 2235

Sponsor: LASL

SITE: NTS - Area 3-d 37° 02' 56" N 116° 02' W Site elevation: 4,050 ft

HEIGHT OF BURST: -500 ft
Underground

TYPE OF BURST AND PLACEMENT:

Subsurface burst Partially
stemmed well. Levice located
at the bottom of a cased 200
ft hole with a 50 ft block of
concrete above it, and an open
space up to a heavy concrete
cap at the top.

## REMAIKS:

No fallout was observed. Results of the survey indicated background levels of beta-gamma radiation and a maximum of  $300 \text{ c/m/55 cm}^2$  of alpha activity at one location.

#### Franklin Prine

PDT GMT

DATE: 30 Aug 1957 30 Aug 1957

TIME: 0540 1240

TOTAL YIELD: 4.7 kt

FIREBALL DATA:

Time to 1st minimum: NM
Time to 2nd maximum: 91 to 92 msec
Radius at 2nd maximum: NM

CRATER DATA: No crater

Sponsor: LASL

SITE: NTS - Area 7b 37° 05' 12" N 116° 01' 25" W Site elevation: 4,186 ft

HEIGHT OF BURST: 750 ft

TYPE OF BURST AND PLACEMENT:

Air burst from balloon over
Nevada soil

CLOUD TOP HEIGHT: 32,000 ft MSI.
CLOUD BOTTOM HEIGHT: 21,000 ft
MSL

## REMARKS:

The contamination was due primarily to induced activity. The on-site pattern was obtained from ground survey readings of the Radiological Safety Division of Reynolds Electrical and Engineering Co., Inc., using AN/PDR 39 and AN/PDR 143 survey instruments. The readings were taken at H+2 hour, H+6 hours, D+2 days and D+3 days along eight radial roads to determine radiation exclusion areas. The dose-rate readings were extrapolated to H+1 hour by the aerial induced activity decay curve for Nevada soil

The extrapolated dose rates are not very accurate because the induced activity decay factor is not strictly applicable.

The off-site fallout was analyzed by the USWB Special Projects Section. The  $t^{-1\cdot 2}$  decay approximation was used to extrapolate the dose-rate readings to H+1 hour. "A considerable amount of the radioactivity observed following Franklin Prime can be attributed to residual debris from previous tower bursts, primarily Shasta and Diablo. This residual activity had to be subtracted from the activity recorded. The resulting pattern should be considered merely as an approximation.

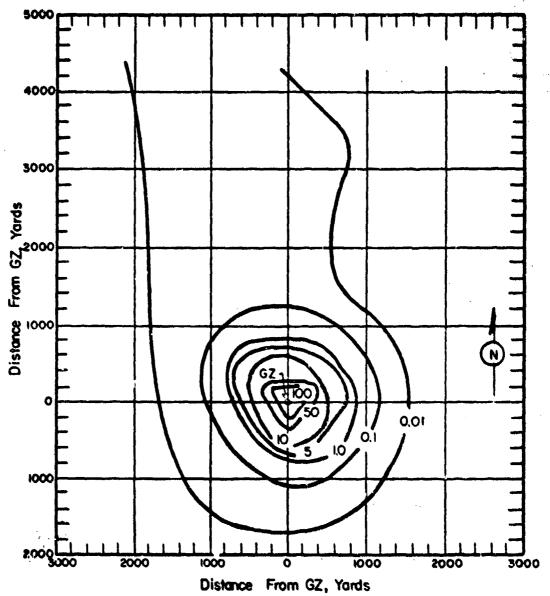


Figure 204. Operation PLUMBBOB - Franklin Prime.
On-site dose rate contours in r/hr at H+l hour.

NEVADA WIND DATA FOR OPERATION PLUMBBOB-

Altitude	H-hot	ır	H+2 hours		Altitude	H-ho	our	H+2 hours	
(MSL)	Dir	Speed	Dir	Speed	(MSL)	Dir	Speed	Dir	Speed
feet	degrees	mph	degrees	mph	feet	degrees	mph	degrees	mph
Surface	Calm	Calm	Calm	Calm	29,000	230	46		; <b></b>
4,936(BI	н) 340	02		<b>**</b> •	30,000	220	46	220	45
5,000	330	02	180	02	31,000	220	44		
6,000	210	06	230	05	32,000	220	51		
7,000	160	12	130	09	33,000	220	54	-	
8,000	130	14	160	14	34,000	220	54	.e ===	
9,000	140	15	160	16	35,000	220	55	210	47
10,000	160	16	170	18	36,000	220	55	<b>,</b> ,,	
11,000	170	17			37,000	220	54		
12,000	170	20	170	24	38,000	220	49		
13,000	180	55		-	39,000	220	51		
14,000	180	22	180	40	40,000	220	56	220	49
15,000	180	25	(180)	(36)	41,000	220	60		
16,000	190	32	190	31.	42,000	220	49		
17,000	190	33			43,000	220	47		
18,000	190	31	220	28	44,000	220	48		
19,000	200	36			45,000	220	49	240	55
20,000	210	36	210	36	46,000	230	52		
21,000	210	33			47,000	230	47		
22,000	220	33			48,000	230	40		
23,000	200	35	210	33	49,000	220	30		
24,000	220	35			50,000	550	28	210	38
25,000	220	39	230	36	51,000	220	26		
26,000	220	39			52,000	220	28		***
27,000	220	40			53,000	220	29		~-
28,000	230	44							

Numbers in parentheses are estimated values.

Tropopause height was 32,500 ft MSL at H-hour.

Wind data was obtained from the Yucca weather station.

At H+3 hours the surface air pressure was 868 mb, the temperature 11.0°C, the dew point -3.7°C and the relative humidity 35%.

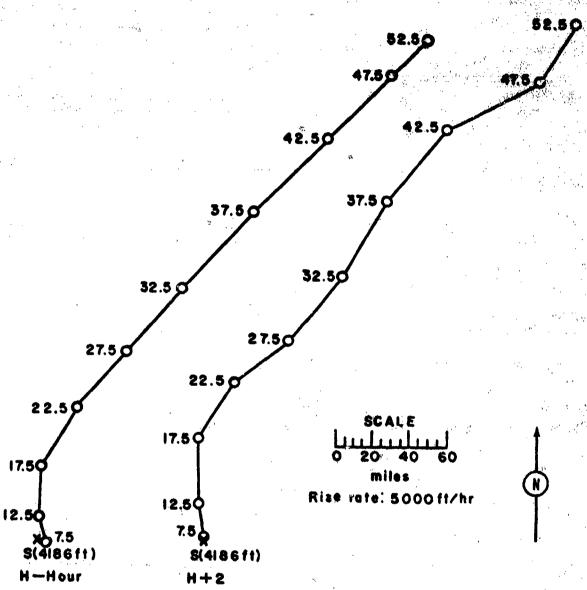


Figure 205. Hodographs for Operation PLUMBBOB -

Franklin Prime.

**Smoky** 

PDT DATE: 31 Aug 1957 31 A

31 Aug 1957

TIME: 0530

1230

TOTAL YELD: 44 kt

Sponsor: UCRL

SITE: NTS - Area - 2c 37° 11' 14" N

116° 04' 04" W

Site elevation: 4,479 ft

FIREBALL DATA:

Time to 1st minimum: NM

Time to 2nd maximum: 245 to 275 msec

Radius at 2nd maximum: NM

HEIGHT OF BURST: 700 ft

TYPE OF BURST AND PLACEMENT:

Tower burst over Nevada soil

CLOUD TOP HEIGHT: 38,000 ft MSL

CLOUD BOTTOM HEIGHT: NM

CRATER DATA: No crater

## REMARKS:

The on-site fallout pattern was obtained from ground survey readings of the Radiological-Safety Division of Reynolds Electrical and Engineering Co., Inc., using AN/PDR 39 and AN/PDR 43 survey instruments. The readings were taken at H+8 hours, D+1 day, D+3 days and D+5 days along eight radial roads to determine radiation exclusion areas. The t-1.2 decay approximation was used to extrapolate the dose-rate readings to H+1 hour. The higher dose rates are not very reliable because several days elapsed before such readings were taken.

The off-site fallout pattern was obtained by "The Test Manager's Committee for the Evaluation of Radiation Doses." This committee analyzed all available data and used the actual decay data obtained by the UCLA School of Medicine Atomic Energy Project to report H+12-hour dose-rate contours. The t-1.2 decay approximation was used to extrapolate the H+12-hour dose-rate contours to H+1 hour. The pattern is based on ground and aerial survey data. The time of arrival was estimated by using measured times at known points.

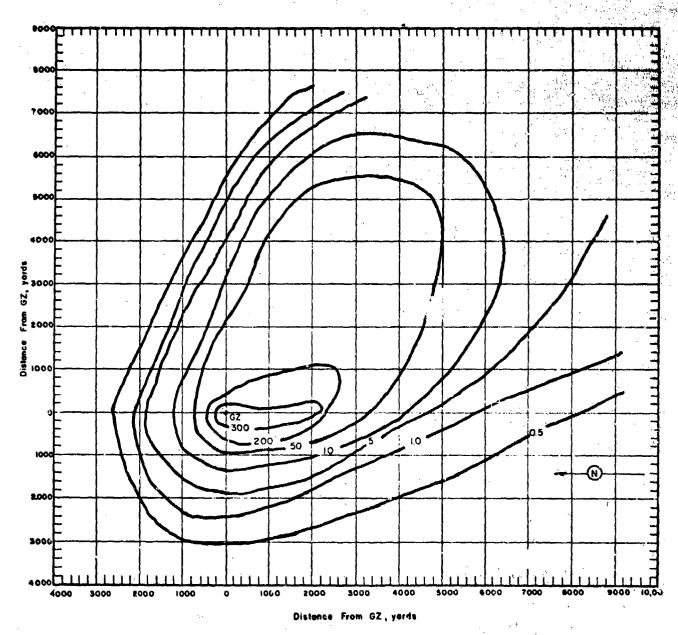


Figure 206. Operation PLUMBROB - Smoky.
On-site dose rate contours in r/hr at H+1 hour.

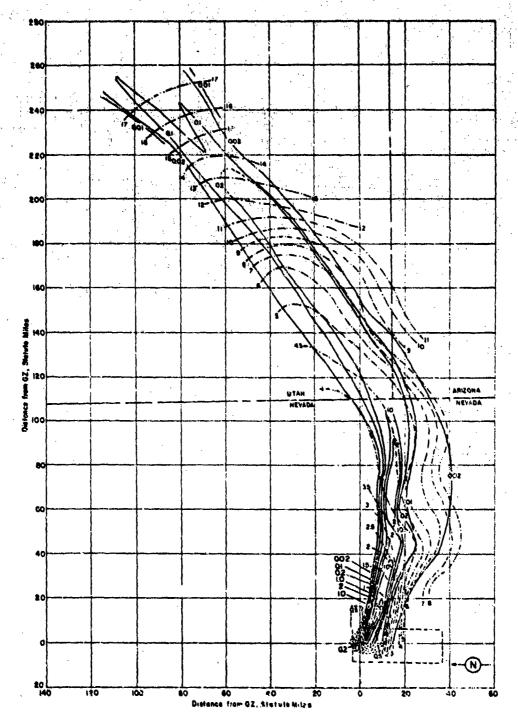


Figure 207. Operation PLUMBBOR - Smoky
Off-site dose rate contours in r/hr at H+1 hour.

TABLE 61 NEVADA WIND DATA FOR OPERATION PLUMBBOB-

Altitude	H-hour		H+3 hours		Altitude	H-hou	ır.	II+3 hours	
(MSL)	Dir	Speed	Dir	Speed	(MSL)	Dir	Speed	Dir	Speed
feet	degrees	mph	degrees	mph	feet	degrees	mph	degrees	mby
Surface	Calm	Calm	Calm	Calm	29,000	280	36		<u> </u>
5,000	Calm	Calm	330	05	30,000	280	37	300	33
5,179 (1	BH)Calm	Calm			J,	. 280	33		**
6,000	340	06	350	05	32,000	280	36		-,-
7,000	010	07	060	07	33,000	270	38		
8,000	010	07	080	09	34,000	270	37		
9,000	010	10	040	06	35,000	270	37	300	35
10,000	360	12	360	06	36,000	270	40		
11,000	360	09			37,000	270	44		
12,000	360	07	360	05	38,000	270	43		~-
13,000	360	07			39,000	270	39		~-
14,000	020	07	280	06	40,000	270	35	250	33
15,000	340	09	(280)	(09)	41,000	270	32		
16,000	290	13	280	13	42,000	270	.36	ar to 10	
17,000	280	18			43,000	260	38		
18,000	290	22	290	20	44,000	260	35		
19,000	290	21			45,000	250	38	250	39
20,000	280	24	300	23	46,000	230	45		
21,000	280	29			47,000	250	40		
22,000	280	29			48,000	260	36		
23,000	280	30	280	31	49,000	250	35		
24,000	270	35			50,000	240	31	240	25
25,000	270	36	280	38					
26,000	280	36							× .
27,000	270	33						*	•
28,000	270	31							•

- Numbers in parentheses are estimated values.

- Numbers in parentheses are estimated values.
   Tropopause height was 35,000 ft MSL at H-hour.
   Wind data was obtained from the Yucca weather station.
   At H-hour the air pressure was 856 mb, the temperature 14°C, the dew point -3.6°C and the relative humidity 31%.

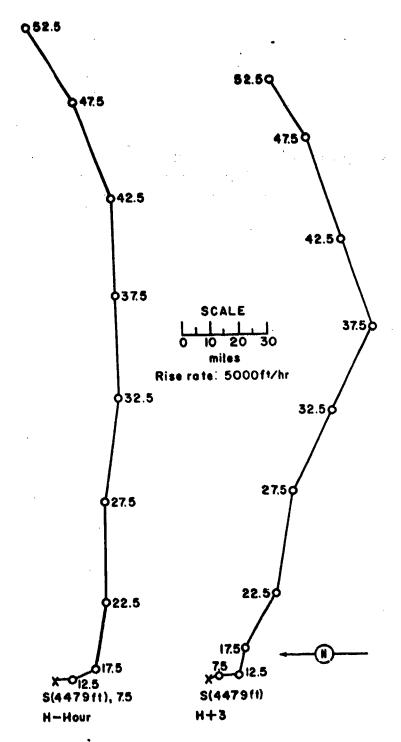


Figure 208. Hodographs for Operation PLUMBBOB -

Smoky

#### Galileo

PDT GMT

DATE: 2 Sep 1957 2 Sep 1957

TIME: 0540 1240

TOTAL YIELD: 11 kt

FIREBALL DATA:

Time to 1st minimum: NM
Time to 2nd maximum: NM
Radius at 2nd maximum: NM

CRATER DATA: No crater

Sponsor: LASL

SITE: NTS - Area 1 37° 03' 11" N 116° 06' 09" W Site elevation: 4,250 ft

HEIGHT OF BURST: 500 ft

TYPE OF BURST AND PLACEMENT:
Tower burst over Nevada soil

CLOUD TOP HEIGHT: 37,000 ft MSL CLOUD BOTTOM HEIGHT: 17,000 ft MSL

## REMARKS:

The on-site pattern was obtained from ground survey readings of the Radiological Safety Division of Reynolds Electrical and Engineering Co., Inc., using AN/PDR 39 and AN/PDR 43 survey instruments. The readings were taken for H+2 hours, H+6 hours, D+1 day, D+2 days and D+3 days along eight radial roads to determine radiation exclusion areas. The dose-rate readings were extrapolated to H+1 hour by the t-1.3 decay approximation.

The off-site fallout was analyzed by Program 37 of UCLA. Actual decay data was used to plot the H+12-hour dose-rate contours. The t-1.2 decay approximation was used by NDL to extrapolate the H+12-hour dose-rate readings to H+1 hour. The pattern is based on ground and aerial survey data. "The west edge and the close-in portion of this pattern was estimated due to the lack of data"

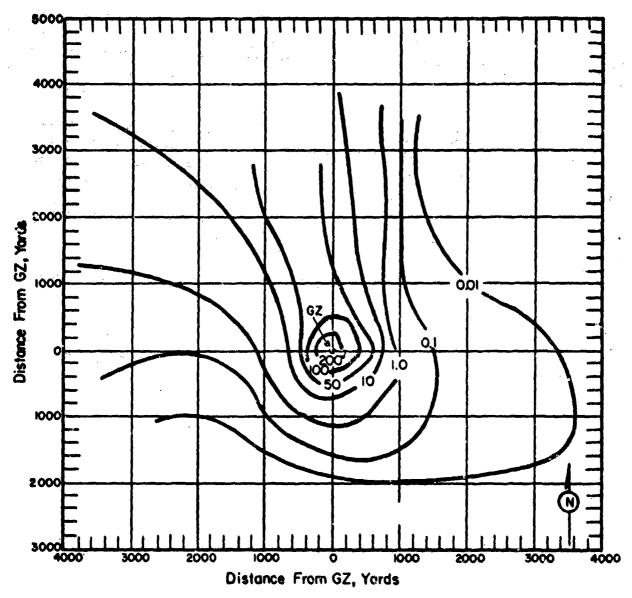


Figure 209. Operation PLUMBROB - Galileo.
On-site dose rate contours in r/hr at H+l hour.

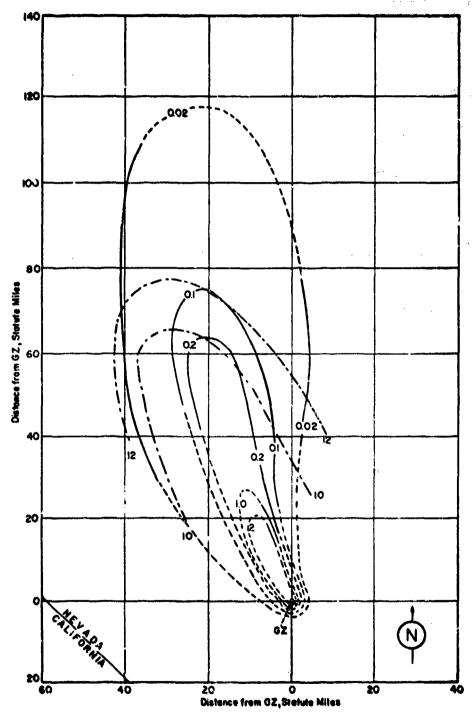


Figure 210. Operation PLUMBBOB - Galilec.
Off-site dose rate contours in r/hr at H+l hour.

TABLE 62 NEVADA WIND DATA FOR OPERATION PLUMBBOB-

CALILED

Altitude	H-hou		H+2 hou	rs	H+5 hours		
(MSL)	Dir	Speed	Dir	Speed	Dir	Speed	
feet	degrees	mph	degrees	<b>mp</b> h	degrees	mph	
Surface	Calm	Calm	Calm	Calm	Calm	Calm	
4,740(EH)	Calm	Calm			***	•=	
5,000	Calm	Calm	Calm	Calm	130	05	
6,000	230	01	Calm	Calm	150	09	
7,000	200	<b>65</b>	Calm	Calm	150	1é	
8,000	170	05	120	09	150	70	
9,000	150	05	140	15	160	08	
10,000	140	05	140	15	160	07	
11,000	150	07					
12,000	140	oż	<b>i</b> 50	13	160	09	
13,000	160	09			***		
14,000	160	07	140	07	150	09	
15,000	160	o8	(150)	(06)	(160)	(06)	
16,000	150	09	150	05	170	`03	
17,000	130	09			210		
18,000	130	10	150	05	140	03	
19,000	130	06	1,0		140		
20,000	080	02	110	05	130	05	
21,000	010	06	110		130		
22,000	010	07			•••		
23,000	010	07	O40	05	030	07	
24,000	030	07	<del></del>		030	20	
25,000	070	o8	180	02	110	05	
26,000	090	09	100		110	-	
27,000	070	12					
28,000		10					
	070 070	80					
29,000		07	040	05	010		
30,000	070 060	•	040	05	010	05	
31,000	040	07 08					
32,000	010	75 00					
33,000	010	15 15					
34,000		12 12	000			~~	
35,000	040		020	02	050	07	
36,000 37,000	030	13					
37,000	010	14	~~~	<b>45</b> 44	***		
38,000	360	14		-			
39,000	340	15			***	••	
40,000	330	97	<b>290</b>	09	270	08	
45,000	240	38	240	25	540	21	
50,000	260	36	190	59	250	32	

Numbers in parentheses are estimated values.

Tropopause height was 39,300 ft MSL at H-hour.

<sup>3.</sup> Wind data was obtained from the Yucca weather station.
4. At H-hour the surface at a processing of the surface at a su At H-hour the surface air pressure was 878 mb, the temperature 15.8°C, the dew point -1.5°C and the relative humidity 30%.

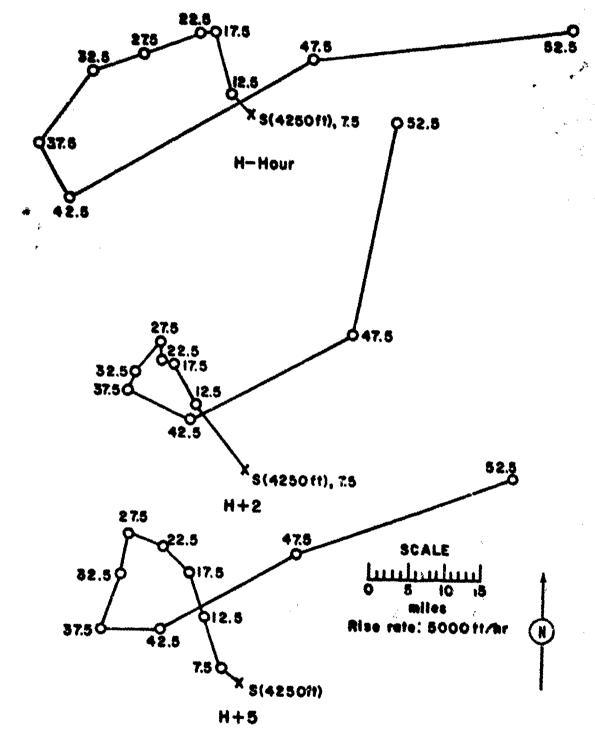


Figure 211. Hodographs for Operation PLUMBBOB -

Galileo.

#### Wheeler

PDT GMT

DATE: 6 Sep 1957 6 Sep 1957

TIME: 0545 1245

TOTAL YIELD: 197 tons

FIREBALL DATA:

Time to 1st minimum: NM
Time to 2nd maximum: NM
Radius at 2nd maximum: NM

CRATER DATA: No crater

Sponsor: UCRL

SITE: NTS - Area 9-a 37° 08' 05" N 116° 02' 27" W Site elevation: 4,230 ft

HEIGHT OF BURST: 500 ft

TYPE OF BURST AND PLACEMENT:

Air burst from balloor over
Nevada soil

CLOUD TOP HEIGHT: 17,000 ft MSL CLOUD BOTTOM HEIGHT: 14,000 ft MSL

## REMARKS:

The contamination was due primarily to induced activity. The on-site pattern was obtained from ground survey readings of the Radiological Safety Division of Reynolds Electrical and Engineering Co., Inc. using AN/PDR 39 and AN/PDR 43 survey instruments. The readings were taken at H+1 hour, H+8 hours, D+1 day, D+2 days and D+3 days along eight radial roads to determine radiation exclusion areas. The dose rate readings were extrapolated to H+1 hour by the general induced-activity-decay curve for Nevada soil. The pattern is not reliable. The measurements include some residual radiation from previous shots.

The fallout detected by the off-site survey could not be definitely attributed to Wheeler, but may well have been from previous shots.

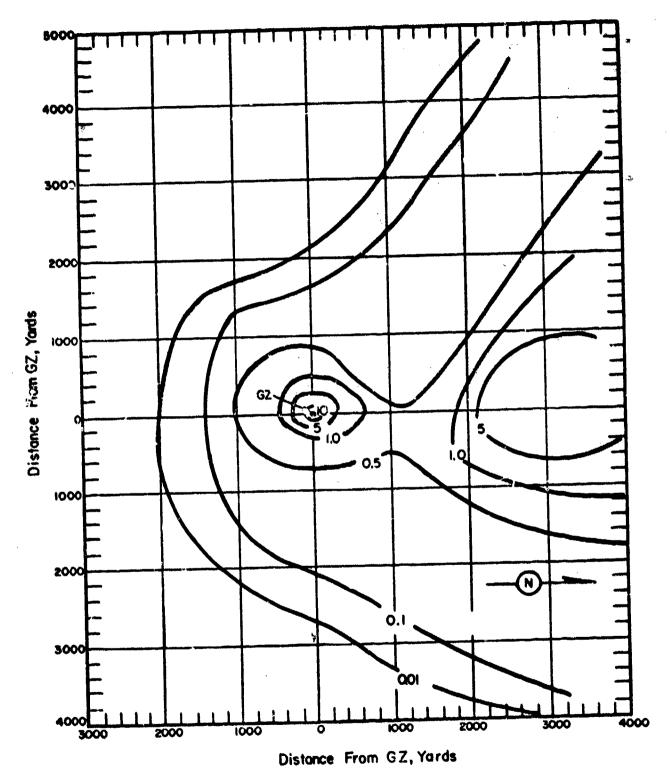


Figure 212. Operation PLUMEROB - Wheeler. On-site dose rate contours in r/hr at H+l hour.

The state of the property of the state of th

Altitude	H-ho	our	II+2 ho	urs	Altitude	II-ho	ır	H+2 ho	
(MSL)	Dir	Speed	Dir	Speed	(MSL)	Dir	Speed	Dir	Speed
ſeet	degrees	mph	degrees	mph	feet	degrees	mph	degrees	mph
Surface	Calm	Calm	330	03	29,000	090	37		
4,715(BI	I). 350	03			30,000	090	37	090	52
5,000	020	96	330	07	31,000	090	45		
<b>6,0</b> 00	080	07	040	07	32,000	090	55 66	<b></b> ,	
7,000	100	07	060	09	33,000	090	66		
8,000	110	09	080	09	34,000	090	70		
9,000	120	12	090	13	35,000	090	71	080	87
10,000	120	13	100	16	36,000	090	73		
11,000	130	15	~ - ~	40 10	37,000	080	.74		
12,000	130	17	120	18	38,000	080	70 '		
13,000	120	17			39,000	080	67	.,	
14,000	120	20	120	20	40,000	080	67	080	78
15,000	110	20	(120)	(20)	41,000	080	67		
16,000	110	24	120	21	42,000	<b>080</b>	61		Ç• <b>→</b> <sup>17</sup> .
17,000	120	29			43,000	080	55 <sup>`</sup>		
18,000	120	24	140	17	44,000	୦୪୦	51		
19,000	140	17			45,000	080	47	<b>08</b> 0	62
20,000	130	16	120	12	46,000	070	45		
21,000	1.30	16			47,000	. 070	40		
22,000	120	17		~-	48,000	060	33		
23,000	110	18	120	20	49,000	060	3 <b>3</b>	***	
24,000	120	17			50,000	060	33	070	28
000ر 25	110	20	110	26	51,000	060	32		
26,000	100	23			52,000	<b>၁</b> 60 1	29		
27,000	100	36			53,000	060	26	<u> </u>	
28,000	100	44			,				

Numbers in parentheses are estimated values.
 Tropopause height was 50,200 ft MSL at H-hour.

Wind data was obtained from the Yucca weather station.

At H-hour the surface air pressure was 876 mb, the temperature 15.0°C, the dew point -3.6°C and the relative humidity 25%.

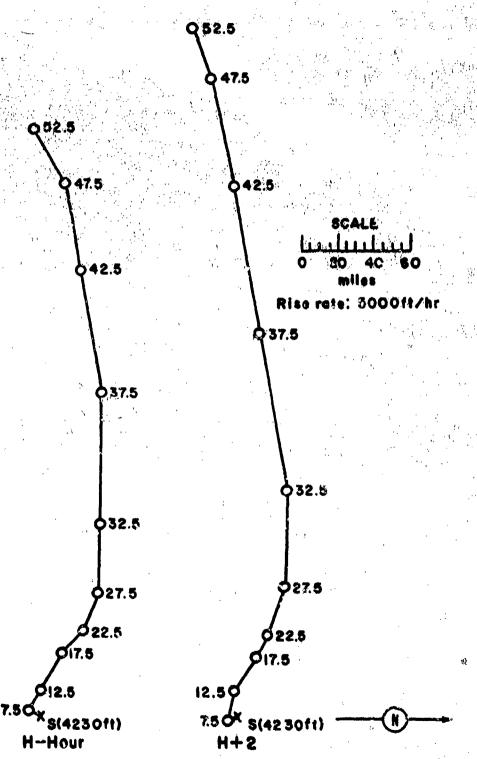


Figure 213. Hodographs for Operation PLUMBBOB -

Wheeler.

## OPERATION PLUMBBOB - Coulomb 8 Safety Experiment

6 Sep 1957 6 Sep 1957

1305 2005

TOTAL YIELD: 0.3 kt

FIREBALL DATA:

Time to 1st minimum: Time to 2nd maximum: Radius at 2nd maximum: NM

CLOUD TOP HEIGHT: 18,000 ft MSL

Sponsor: LASL

SITE: NTS

1160 01'

Site elevation:

HEIGHT OF BURST:

TYPE OF BURST AND PLACEMENT: Surface burst on Nevada soil

CLOUD FOTTOM HEIGHT:

## REMARKS:

The on-site fallout pattern was obtained from ground survey readings of the Radiological Safety Division of Reynolds Electrical and Engineering Co., Inc., using AN/PDR 39 and AN/PDR 43 survey instruments. The readings were taken at  $H+\frac{1}{2}$  nour, H+5 hours, D+1 day, D+2 days, and D+3 days along eight radial roads to determine radiation exclusion areas. The tolerance decay approximation was used to extrapolate the dose-rate readings to H+1 hour. Significant alpha contamination was detected inside the 1 r/hr isointensity line.

The off-site fallout was analyzed by the USWB Special Projects Section The t-1.2 decay approximation was used to extrapolate the dose-rate readings to H+l hour. Due to light winds, a large part of the fallout was probably deposited between GZ and the nearest off-site points for which monitoring data were available.

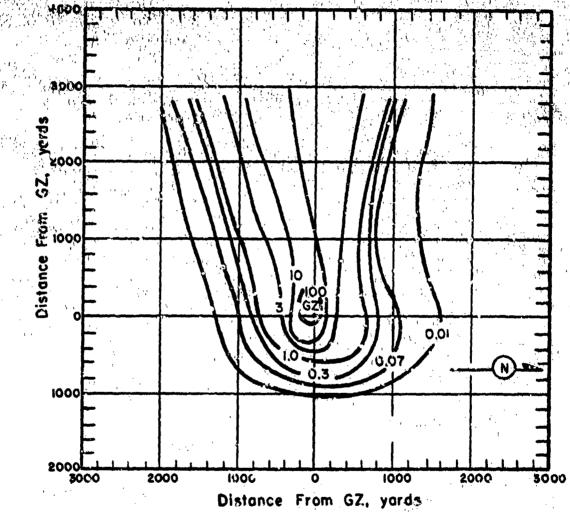


Figure 214. Operation PLUMBBOB - Coulomb B. On-site dose rate contours in r/hr at H+1 hour.

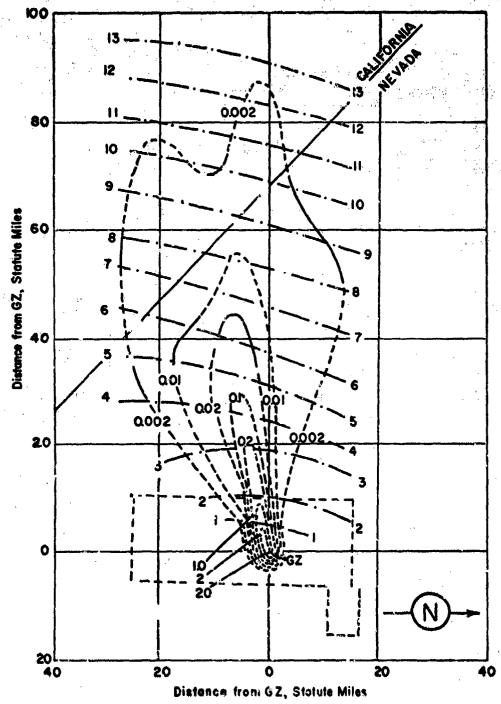
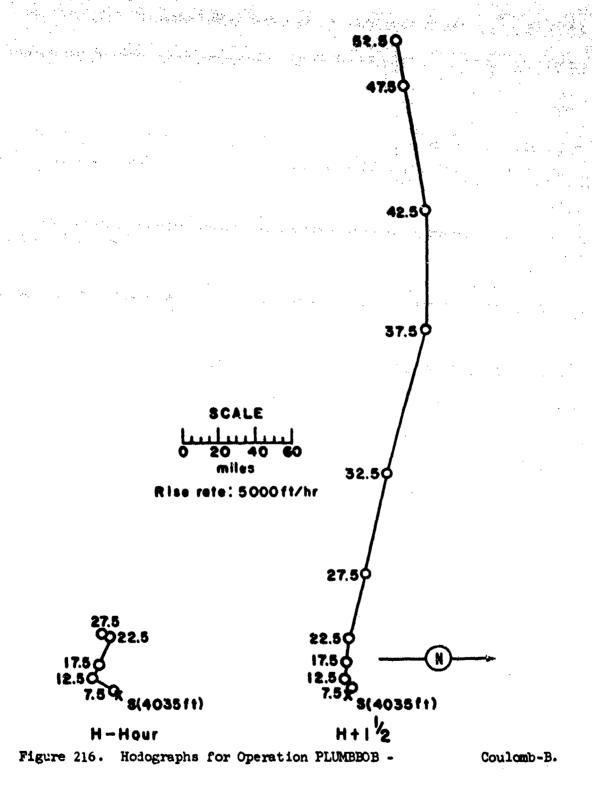


Figure 215. Operation PLUMBBOB - Coulomb B. Off-site dose rate contours in r/hr at H+1 hour.

Altitude	H-ho	ur	H+15	hours	
(MSL)	Dir	Speed	Dir	Speed	
feet	degrees	mbjr	degrees	mph	
Sui 😽 .	050	96	120	05	
<b>4</b> , ∪0	050	06	120	05	
5,000	040	09	130	05	
6,000	020	-0 <del>9</del>	150	05	
7,000	030	09	150	03	
8,000	040	10	070	02	
9,000	040	13	040	05	
10,000	030	13	050	05	
12,000	020	06	070	05	
14,000	140	05	070	09	
15,000	(120)	(80)	(090)	(08)	
16,000	`100	1.2	100	`08	
18,000	110	18	120	02	蒙
20,000	110	14	090	12	
23,000	270	<b>3</b> 5	090	30	
25,000	010	02	100	57	
30,000			100	57	
35,000			100	79	
40,000	=		030	74	
45,000			080	68	
50,000	ec es es		080	24	

- Numbers in parentheses are estimated values.
- Wind data was obtained from the Yucca weather station.
   Tropopause height was 50,000 ft MSL.



LaPlace

PDT GMT

DATE: 8 Sep 1957 8 Sep 1957

TIME: 0600 1300

TOTAL YIELD: 1 kt

FIREBALL DATA:

Time to 1st minimum: NM
Time to 2nd maximum: NM
Radius at 2nd maximum: NM

CRATER DATA: No crater

Sponsor: LASL

SITE: NTS - Area 7b 37° 05' 12" N 116° 01' 25" W Site elevation: 4,186 f

MEIGHT OF BURST: 750 ft

TYPE OF BURST AND PLACEMENT:

Air burst from balloon over
Nevada soil

CLOUD TOP HEIGHT: 20,000 ft MSL CLOUD BOTTOM HEIGHT: 14,000 ft MSL

## REMARKS:

The contamination was due primarily to induced activity. The on-site pattern was obtained from ground survey readings of the Radiological Safety Division of Reynolds Electrical and Engineering Company, Inc., using AN/PDR 39 and AN/PDR 43 survey instruments. The readings were taken at H+1 hour, H+6 hours, D+1 day, D+2 days and D+3 days along eight radial roads to determine radiation exclusion areas. The dose rate readings were extrapolated to H+1 hour by the general induced-activity-decay curve for Nevada soil.

No off-site fallout was observed. The off-site monitors obtained only a few readings slightly above background.

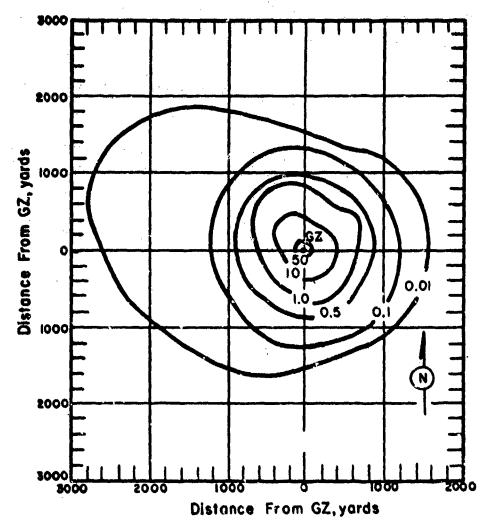


Figure 217. Operation PLUMBBOB - LaPlace.
On-site dose rate contours in r/hr at H+l hour.

NEVADA WIND DATA FOR OPERATION PLUMBBOB -

LAFLACE

Altitude	H-ho	ur	H+2 h	ours	Altitude	H-ho	ur	II+2 hours	
(MSL)	Dir	Speed	Dir	Speed	(MSL)	Dir	Speed	Dir	Speed
feet	degrees	mph	degrees	mph	feet	degrees	mph	degrees	mph
Surface	Calm	Calm	Calm	Calm	29,000	170	24		
4,936(BI	н) 260	02			30,000	160	32	150	24
5,000	260	05	270	05	31,000	160	36		
6,000	260	10	280	07	32,000	150	36		***
7,000	270	15	270	10	33,000	150	36		
8,000	270	15	260	16	34,000	150	33		~-
9,000	290	13	280	15	35,000	150	31	160	28
10,000	290	12	300	13	36,000	150	31		
11,000	290	12			37,000	150	29		
12,000	290	09	280	07	38,000	160	24		
13,000	290	12		•	39,000	160	24		
14,000	280	09	230	<b>Q</b> 5	40,000	160	24	180	18
15,000	160	07	(210)	(07)	41,000	170	20		
16,000	150	07	200	09	42,000	180	18	***	
17,000	150	06		*** en	43,000	160	24		
18,000	160	07	170	05	44,000	160	5/+		
19,000	140	07			45,000	160	24	180	20
20,000	120	05	100	09	46,000	160	16		
21,000	110	02			47,000	190	12		
22,000	010	02			48,000	270	12		
23,000	060	80	080	16	49,000	350	10		
24,000	100	12			50,000	060	07	050	09
25,000	100	13	1031	17	- •		•		•
<b>26,00</b> 0	110	14							
27,000	130	14							
28,000	150	18							

<sup>1.</sup> Numbers in parentheses are estimated values.

<sup>2.</sup> Tropopause height was 44,300 ft MSL at H-hour.

<sup>3.</sup> Wind data was obtained from the Yucca weather station.
4. At H-hour the surface air pressure was 874 mb, the temperature 19.0°C, the dew point 1.2°C and the relative humidity 30%.

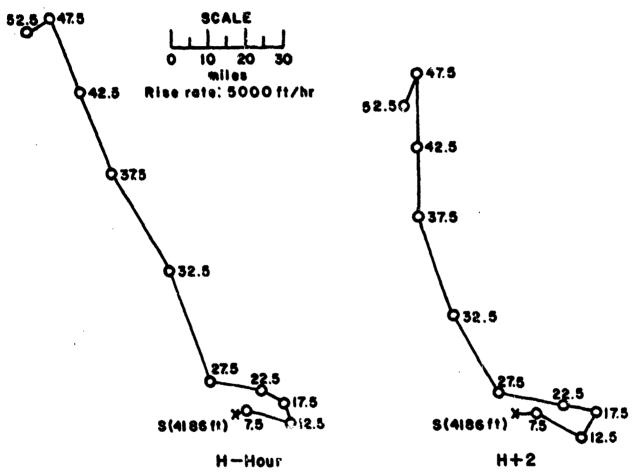


Figure 218. Hodographs for Operation PLUMBBOB -

LaPlace.

#### Fizeau

DATE: 14 Sept 1957 14 Sept 1957
TIME: 0945 1645

TOTAL YIELD: 11 kt

FIREBALL DATA:

Time to 1st minimum: NM
Time to 2nd maximum: NM
Radius at 2nd maximum: NM

CRATER DATA: No crater

Sponsor: LASL

SITE: NTS - Area 3b 37° 02' 01" N 116° 01' 53" W Site elevation: 4,030 ft

HEIGHT OF BURST: 500 ft

TYPE OF BURST AND PLACEMENT:
Tower burst over Nevada soil

CLOUD TOP HEIGHT: 40,000 ft MSL CLOUD BOTTOM HEIGHT: 27,000 ft MSL

#### REMARKS:

The on-site pattern was obtained from ground survey readings of the Radiological Safety Division of Reynolds Electrical and Engineering Co., Inc., using AN/PDR 39 and AN/PDR 43 survey instruments. The readings were taken at H+1 hour, H+6 hours, D+1 day and D+2 days along eight radial roads to determine radiation exclusion areas. The doserate readings were extrapolated to H+1 hour by the t-1.2 decay approximations.

The off-site fallout was analyzed by Program 37 of UCLA. Actual decay data were used to plot the H+12-hour dose-rate contours. The t-1.9 decay approximation was used by NDL to extrapolate the H+12-hour dose-rate readings to H+1 hour. "On-Site Rad-Safety supplied data relative to the intensities in Yucca Flat from this shot. Further away, the west edge is estimated since no information was available in this region"

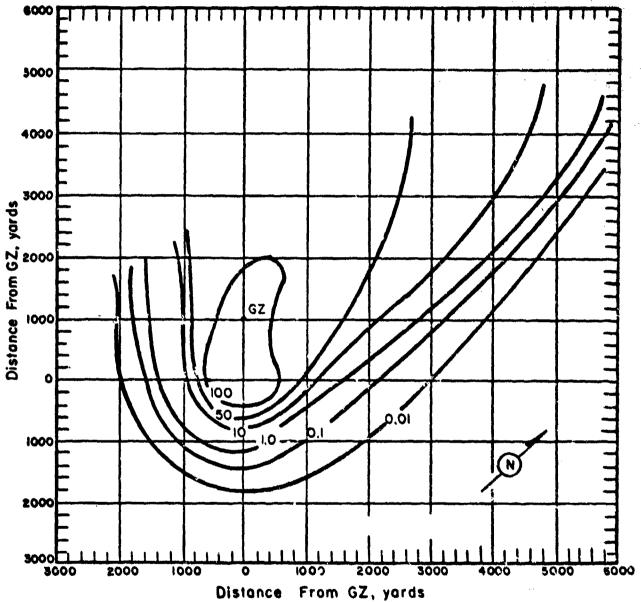


Figure 219. Operation PLUMBBOB - Fizeau.
On-site dose rate contours in r/hr at H+l hour.

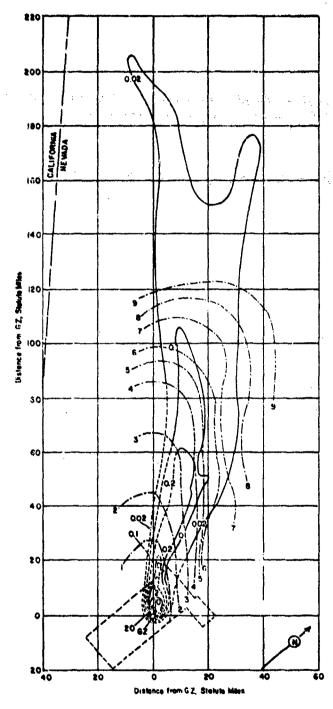
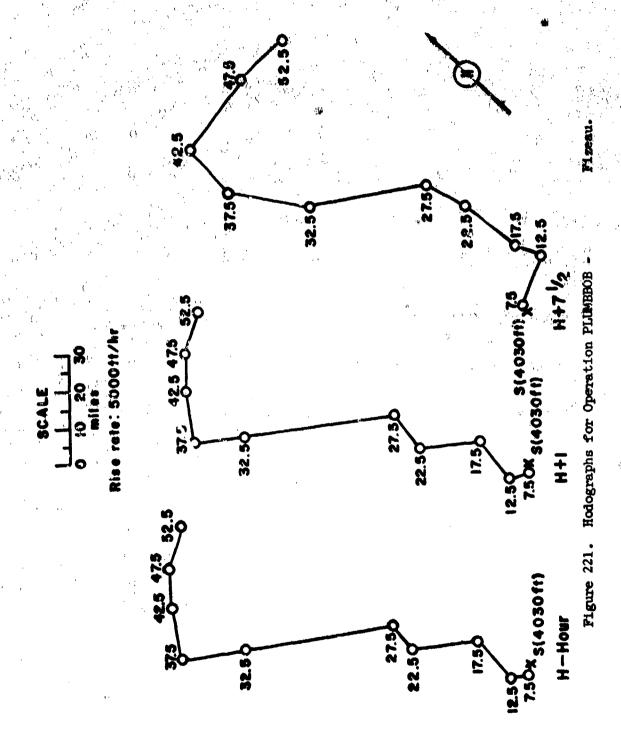


Figure 220. Operation PLUMBBOB - Fizeau.
Off-site dose rate contours in r/hr at H+l hour.

NEVADA WIND DATA FOR OPERATION PLUMBBOB-

Altitude	h-ho		H+1 ho		H+73 hou	
(MSL)	Dir	Speed :		Speed	Dir	Speed
feet	degrees	mph	degrees.	ribit ,	degrees	mbp
Eurface	Calm	Calm	Calm	Ca la	180	05
4,497(BH)	Calm	Calin		,00,00	2.00	
5,000	050	05	050	05	180	05
6,000	070	. 05	070	05	190	05
7,000	070	Öğ	070	03	\$10 130	05
8,000	080	05	080	02	240	06
0,000	090	02	090	02	240	10
9,000	110					14
10,000	. ,	05	110	.05	250	14
11,000	170	07		-	-	
12,000	180	- 03	180	c <b>07</b> ;	190	09
13,000	210	07				
74,000	190	12	750	,13,	150	06
15,000	180	13	(180)	(13)	(150)	(07)
16,000	<b>18</b> 0	13	180	13	140	.09
17,000	170	10		<del></del>		<b>*</b>
18,000	150	09	350	09	160	15
19,000	120	14				
20,000	120	17	120	27	270	16
21,000	100	18		<u></u>		
22,000	110	5.				
23,000	120	12	120	12	150	25
24,000	14C	09		~-		
25,000	180	07	180	12	160	12
26,000	160	07	200			
27,000	110	20		.,		
64 600	110	22				
88,000	120	25		**	***	
29,000			100	-,-	200	
30,000	120	: 39	120	39	120	32
31,000	110	29				
32,000	110	26		. ••		== / 1 / /
33,000	120	<b>, 2</b> 4	, <b>**</b> **	••		
34,000	120	22		Ţ-		•
35,000	120	17	120	37	140	21
36,000	150	15				~~ '
37,000	140	14			J	-
38,000	160	14		••		
39,000	190	14		*: 4		
40,000	510	14	210	14	180	17
45,000	220	10	220	10	240	23
50,000	240	12	24C	12	270	15
70,000	~~~	. —	E. 767	-	210	*/

Numbers in parentheses are estimated values.
Tropogause height was 43,000 ft MSL at H-hour.
Wind deta was obtained from the fucca weather station.
At H-nour the surface air pressure was 800 mb, the temperature 25.100, the dew point -1.500, and the relative hamidity 17%.



Newton

PDT GMT

DATE: 16 Sep 1957 16 Sep 1957

TIME: 0550 1250

TOTAL YIELD: 12 kt

FIREBALL DATA:

Time to 1st minimum: NM
Time to 2nd maximum: NM
Radius at 2nd maximum: NM

CLOUD TOP HEIGHT: 32,000 ft MSL CLOUD BOTTOM HEIGHT: 19,000 ft MSL Sponsor: LASL

SITE: NTS - Area 7b 37° 05' 12" N 116° 01' 25" W Site elevation: 4,186 ft

HEIGHT OF BURST: 1,500 rt

TYPE OF BURST AND PLACEMENT:
Air burst from balloon over
Nevada soil

CRATER DATA: No crater

## REMARKS:

The contamination was due primarily to induced activity. The on-site pattern was obtained from ground survey readings of the Radiological Safety Division of Reynolds Electrical and Engineering Co., Inc., using AN/PDR 39 and AN/PDR 43 survey instruments. The readings were taken at H+3 hours, H+6 hours, D+1 day, D+2 days and D+3 days along eight radial roads to determine radiation exclusion areas. The dose-rate readings were extrapolated to H+1 hour by the induced activity decay curve for Nevada soil

The extrapolated dose rates are not accurate because the decay factor used is not strictly applicable.

The off-site fallout was analyzed by Program 37 of UCIA. Actual decay data were used to plot the H+12-hour dose-rate contours. The  $t^{-1\cdot 3}$  decay approximation was used by NDL to extrapolate the H+12-hour dose-rate readings to H+1 hour. Since very little reliable data were available, this pattern is basically an estimate

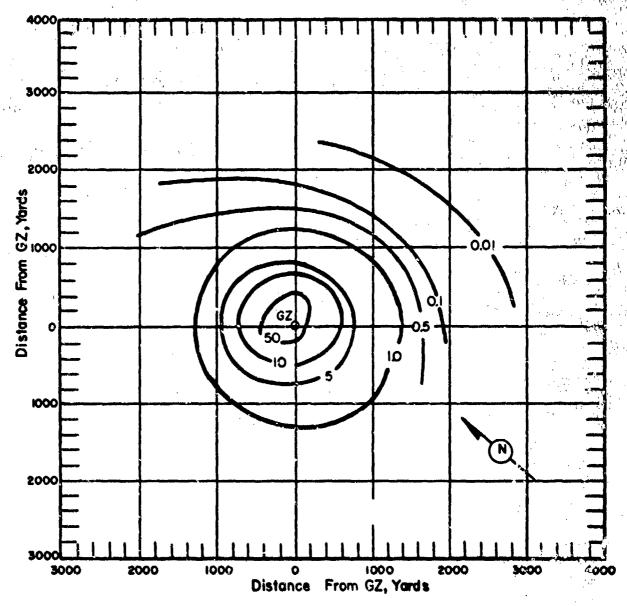


Figure 222. Operation PLUMBBOB - Newton.
On-site dose rate contours in r/hr at H+l hour.

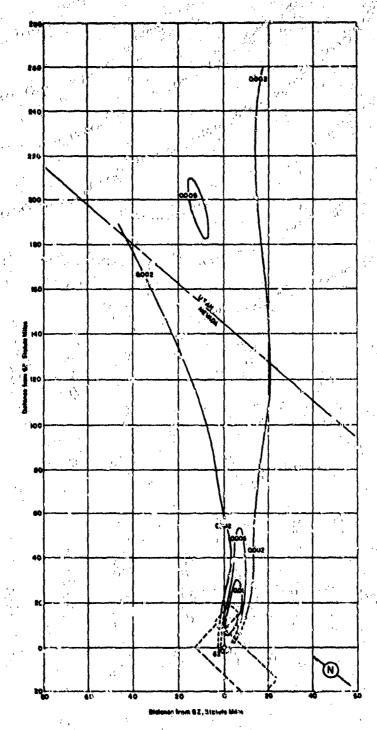


Figure 223. Operation PLUMBBOB - Newton.
Off-site dose rate consours in r/hr at H+1 hour.

NEVADA WIND DATA FOR OPENATION PLUMBBOB-

ltitude	∴H-hov		H+1 ho	117.	II+2+ hours		
(MOL)	Dir	Speed	Dir	ीमपप <u>ी</u>	Dir	Speed	
feat	degrees	mph	degreen	mbyr	degrees	muh	
Burgace	Calm	Calm	Calm	Culm	Calm	Calm	
5.000	200	05	200	05	180	05	
5.686(BH)	200	06		••			
6,000	190	09	190	10	180	09	
7,000	190	17	190	17	180	. 18	
8,000	190	- 50	190	20	180	22	
y <b>,00</b> 0	200	18	200	17	190	22	
10,000	500	20	200	20	190	55	
11,000	200	18					
12,000	200	18	210	55	,510	22	
13,000	210	21					
14,000	220	22	<b>`</b> 550	55	240	.22	
15,000	240	22	(230)	(55)	(240)	(23)	
16,000	240	<b>2</b> 2	240	22	250	25	
17,000	250	25		••			
18,000	250	25	250	26	260	28	
19,000	250	28					
20,000	250	32	250	32	240	29	
21,000	250	33					
22,000	250	32					
23,000	250	45	250	45	240	37	
24,000	250	47					
25,000	250	48	250	48	250	51	
26,000	250	51					
27,000	260	56					
28,000	860	66			-1-		
29,000	260	74					
30,000	260	82	260	82	260	95	
31,000	260	79			,-		
32,000	250	76					
33,000	250	76		~-			
34,000	250	?7	050			00	
35,000	250	75 <b>68</b>	250	75	260	83	
36,000	250						
37,000	250	62 64					
38,000	250	67					
39,000	250		250	58	050	71	
40,000	250	58 60			250	64	
45,000 50,000	250 250	69 38	250 250	69 38 -	250 250	38	

Numbers in parentheses are estimated values. Tropopause height was 52,500 ft MSL at H-hour.

Wind data was obtained from the Those weather station.

At H-hour, the surface air pressure was 862 mb, the temperature 13.2°C, the dew point -5.6°C, and the relative humidity 27%.

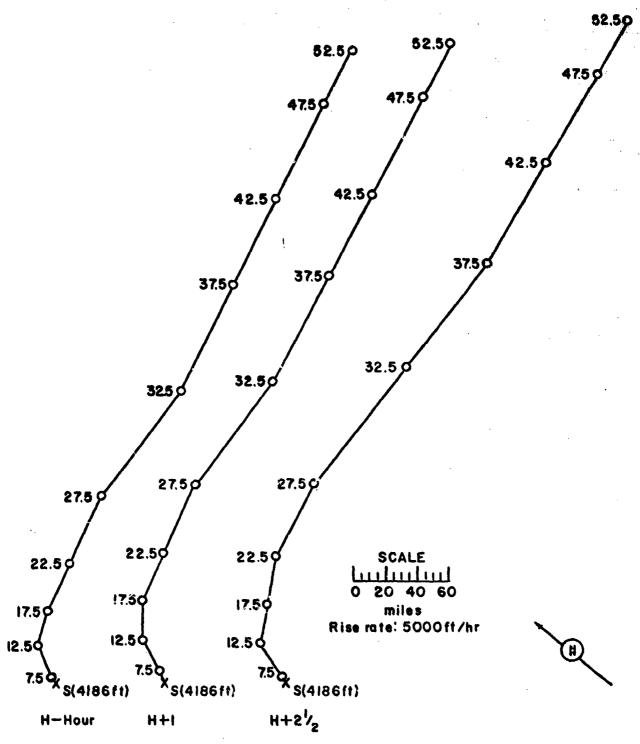


Figure 224. Hodographs for Operation PLUMBBOB -

Newton.

# OPERATION PLUMBBOB -

# Rainier

PDT GMT

DATE: 19 Sep 1957 19 Sep 1957

TIME: 1000 1700

TOTAL YIELD: 1.7 kt

FIREBALL DATA:

Time to 1st minimum: NM
Time to 2nd maximum: NM
Radius at 2nd maximum: NM

CRATER DATA:

The diameter of the contained bubble was 110 ft.

Sponsor: UCRL

SITE: NTS - Area 12b 37° 11' 45" N 116° 12' 11" W Site elevation: 6,611 ft

HEIGHT OF BURST: -800 ft Under-

ground

Vertical depth 399 ft

Slant to nearest surface 790 ft

TYPE OF BURST AND PLACEMENT:

Subsurface burst - Nevada soil

### REMARKS:

No fallout resulted from this detonation. The blast collapsed the tunnel wall and all the radiation was contained in the tunnel.

### OPERATION PLUMBBOP -

### Whitney

PDT CMT

DATE: 23 Sep 1957 23 Sep 1957

TIME: 0530 1230

TOTAL YIELD: 19 kt

FIREBALL DATA:

Time to 1st minimum: NM
Time to 2nd maximum: NM
Radius at 2nd maximum: NM

CRATER DATA: No crater

Sponsor: UCRL

SITE: NTS - Area 2 37° 08' 18" N 116° 07' 03" W Site elevation: 4,486 ft

HEIGHT OF BURST: 500 ft

TYPE OF BURST AND PLACEMENT:
Tower burst over Nevada soil

CLOUD TOP HEIGHT: 30,000 ft MSL CLOUD BOTTOM HEIGHT: 18,000 ft MSL

# REMARKS:

The on-site fallout pattern was obtained from ground survey readings of the Radiological Safety Division of Reynolds Electrical and Engineering Co., Inc., using AN/PDR 39 and AN/PDR 43 survey instruments. The readings were taken at H+2 hours, H+6 hours, D+1 day, D+2 days and D+3 days along eight radial roads to determine radiation exclusion areas. The t-1. decay approximation was used to extrapolate the dose-rate readings to H+1 hour.

The off-site fallout was analyzed by Program 37 of UCLA. Actual decay data were used to plot the H+l2-hour dose-rate contours. The  $t^{-1\cdot 2}$  decay approximation was used by NDL to extrapolate the H+l2-hour dose-rate readings to H+l hour. "This pattern was based on ground and aerial data, but the northern-most portion of the pattern was based on aerial data only. There was no information relative to the close-in levels and this portion was estimated"

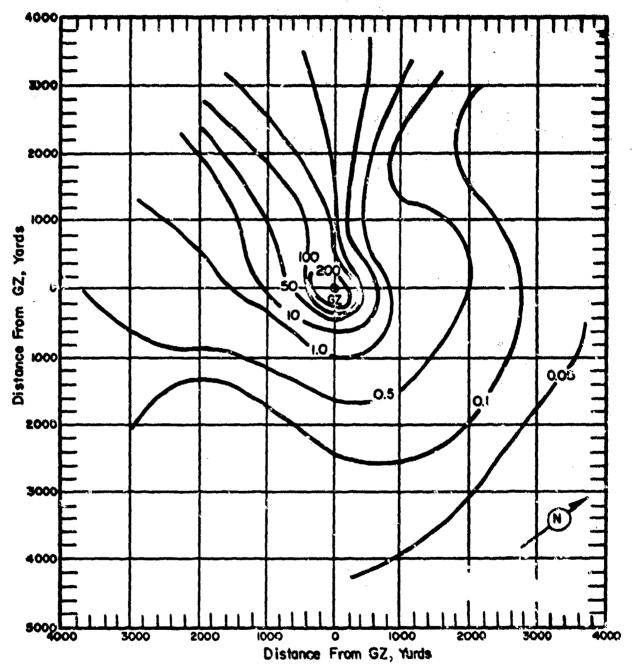


Figure 225. Operation PLUMBBOB - Whitney.
On-site dose rate contours in r/hr at H+1 hour.

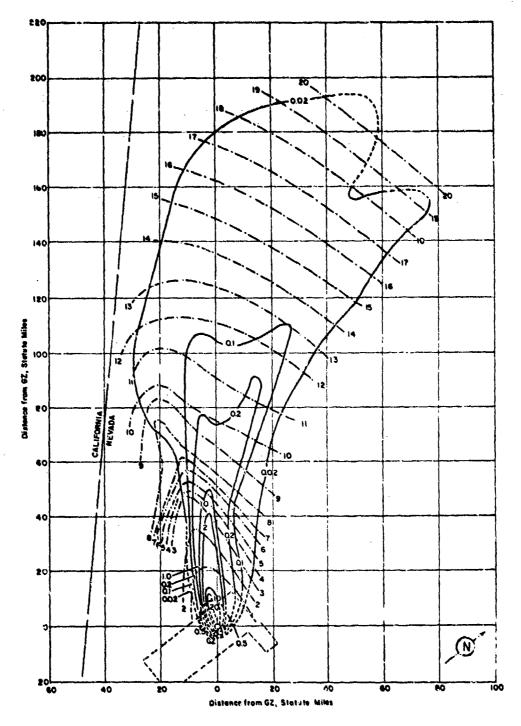


Figure 226. Operation PLUMBEOB - Whitney.
Off-site dose rate contours in r/hr at H+l hour.

TABLE 68 NEVADA WIND DATA FOR OPERATION PLUMBBOB-

Altitude	H-hoi	ır	H+2 h	ours	Altitude	H-hour		H+5}	d'Inon
(MSL)	Dir	Speed	Dir	Speed	(MSL)	Dir	Speed	Dir	Speed
feet	degrees	mph	degrees	mph	feet	degrees	mph	degrees	mojr
Surface	Calm	Calm	360	05	30,000	100	13	100	09
4,987(B	H) Calm	Calm		~ •	31,000	090	09		
5,000	030	09	030	80	32,000	040	06		
6,000	070	12	060	09	33,000	340	06		
7,000	100	12	090	09	34,000	300	10		
8,000	130	12	140	14	35,000	290	12	280	80
9,000	140	12	150	13	36,000	290	10		
10,000	160	09	170	80	37,000	280	09		
11,000	180	12			38,000	280	09	~	
12,000	170	10	160	12	39,000	<b>28</b> 0	13		
13,000	130	16			40,000	270	15	270	13
14,000	120	16	120	14	41,000	270	18		
15,000	120	12	(110)	(14)	42,000	280	20		
16,000	110	12	100	13	43,000	280	18		
17,000	100	09			44,000	280	14	w = m	
18,000	090	12	090	09	45,000	290	21	250	21
19,000	090	12 .			46,000	280	21		
20,000	090	09	080	09	47,000	270	18		
21,000	090	12			48,000	260	21		
22,000	080	12			49,000	260	21		
23,000	070	12	070	12	50,000	260	18	270	20
24,000	060	10			51,000	260	17		
25,000	040	80	070	09	52,000	270	16	***	
26,000	050	05			53,000	270	15		
27,000	070	08			- <del>- •</del>		•		
28,000	090	12							
29,000	090	13							

# NOTES:

<sup>1.</sup> Numbers in parentheses are estimated values.

<sup>2.</sup> Tropopause height was 53,100 ft MSL at H-hour.

<sup>3.</sup> Wind data was obtained from the Yucca weather station.

<sup>4.</sup> At H-hour the surface air pressure was 867 mb, the temperature 16.1°C, the dew point -3.6°C and the relative humidity 25%.

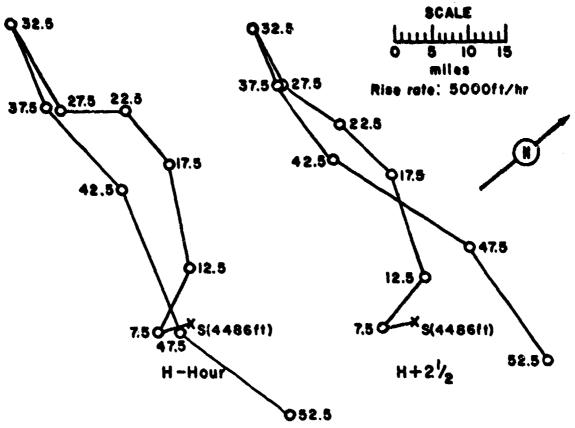


Figure 227. Hodographs for Operation PLUMBBOB -

Whitney.

OPERATION PLUMBBOB -

Charleston

PDT BST

DATE: 20 Sep 1957 28 Sep 1957 TIME: 0600 1300

TOTAL YIELD: 12 kt

FIREBALL DATA:

Time to 1st minimum: NM
Time to 2nd maximum: NM
Radius at 2nd maximum: NM

CLOUD TOP HEIGHT: 32,000 ft MSL CLOUD BOTTOM HEIGHT: 20,000 ft MSL Sponsor: UCRL

SITE: NTS - Area 9a

37° 08' 05" N 116° 02' 27" W

Site elevation: 4,215 ft

HEIGHT OF BURST: 1,500 ft

TYPE OF BURST AND PLACEMENT:

Air burst from balloon over
Nevada soil

CRATER DATA: No crater

# REMARKS:

The contamination was due primarily to induced activity. The on-site pattern was obtained from ground survey readings of the Radiological Safety Division of Reynolds Electrical and Engineering Co., Inc., using AN/PDR 39 and AN/PDR 43 survey instruments. The readings were taken at H+1 hour, H+6 hours, D+1 day, D+2 days and D+3 days along eight radial roads to determine radiation exclusion areas. The doserate readings were extrapolated to H+1 hour by the general induced-activity-decay curve for Nevada soil

The monitors did not detect any off-site fallout which can be attributed to this shot.

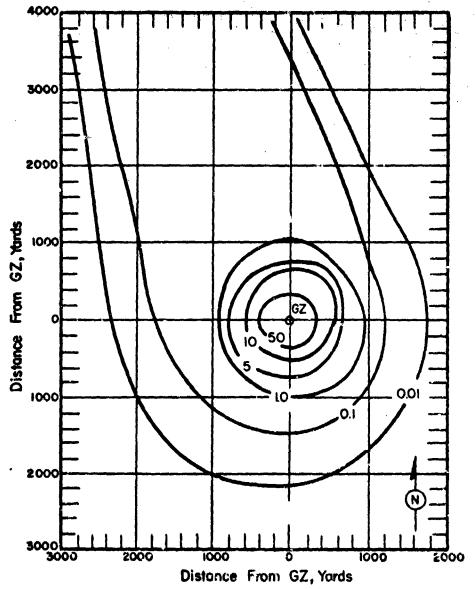


Figure 228. Operation PLUMBROB - Charleston. On-site dose rate contours in r/hr at H+l hour.

Altitude		H+1 hour		ours	II+21 hours	
(MSL)	Dir	Speed	Dir	Speed	Dir .	Speed
feet	degrees	<b>m</b> ph	degrees	mph	degrees	mph
Surface	Calm	Calm	Calm	Calm	Calm	Calm
5,000	180	05	180	05	180	:06
5,715(BH)					180	07
6,000	180	16	180	10	130	09
7,000	180	20	180	15	180	15
8,000	180	22	190	20	190	20
9,000	130	24	190	25	190	25
10,000	190	23	210	26	210	26
11,000					510	26
12,000	190	23	190	38	190	37
13,000	e ==			**	, <b>190</b>	51
14,000	190	42	190	51	190	53
15,000	(190)	(38)	(190)	(47)	190	46
16,000	190	35	190	43	190	1414
17,000				~-	190	55
18,000	180	1414	180	41	180	43
19,000				~	180	45
20,000	190	39	180	37	<b>180</b> 🦼	36
21,000			~		180	35
22,000				~-	180	36
23,000	190	41	190	43	190	43
24,000					190	46
25,000	190	40	190	48	190	47
26,000				••	190	48
27,000					190	51
28,000					190	50
29,000					190	50
30,000	190	44	190	51	190	51
31,000					190	48
32,000					190	50
33,000					190	46
34,000			***		200	43
35,000	200	47	200	38	210	45
40,000	210	45	510	46	550	48
45,000	220	52	210	52	220	52
50,000	220	40	210	40	210	41
60,000	260	07	020	05		

- Numbers in parentheses are estimated values.
   Tropopause height was 44,830 ft MSL at H-hour.
   Vind data was obtained from the Yucca weather station.

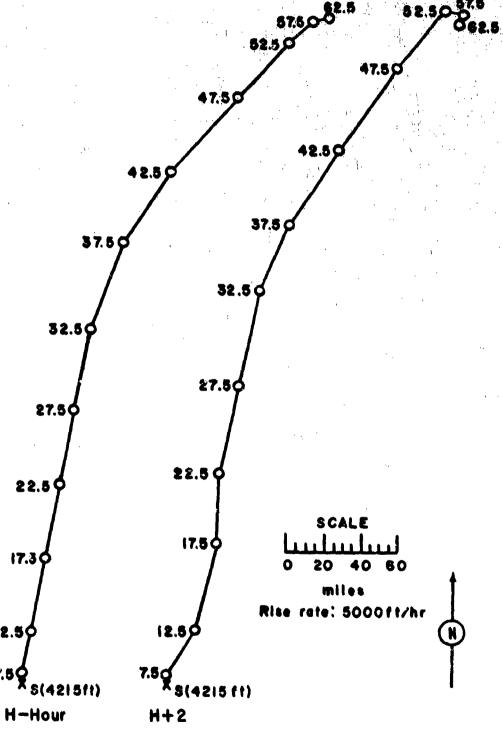


Figure 229. Hodographs for Operation PLUMBBOB -

Charleston.

#### OPERATION PLUMBBOB -

# Morgan

PST CMT

DATE: 7 Oct 1957 7 Oct 1957

TIME: 0500 1300

TOTAL YIELD: 8 kt

FIREBALL DATA:

Time to 1st minimum: NM
Time to 2nd maximum: NM
Radius at 2nd maximum: NM

CRATER DATA: No crater

Sponsor: UCRL

SITE: NTS - Area 9a 37º 08' 05" N

116º 02' 27" W

Site elevation: 4,214 ft

HEIGHT OF BURST: 500 ft

TYPE OF BURST AND PLACEMENT:

Air burst from balloon over Nevada soil

CLOUD TOP HEIGHT: 40,000 ft MSL CLOUD BOTTOM HEIGHT: 26,000 ft MSL

# REMARKS:

The contamination was due primarily to induced activity. The on-site pattern was obtained from ground survey readings of the Radiological Safety Division of Reynolds Electrical and Engineering Company, Inc., using AN/PDR 39 and AN/PDR 43 survey meters. The readings were taken at H+3 hour, H+6 hours, D+1 day, D+2 days and D+3 days along eight radial roads to determine radiation exclusion areas. The dose-rate readings were extrapolated to H+1 hour by the general induced-activity-decay curve for Nevada soil

The off-site fallout was analyzed by the USWB Special Projects Section. The  $t^{-1}$  decay approximation was used to extrapolate the dose-rate readings to H+l hour. "The Morgan debris apparently fell over or near residual debris from Smoky, but the uncertainties in the decay law and in the effects of weathering make it impossible to determine the Morgan pattern with any certainty"

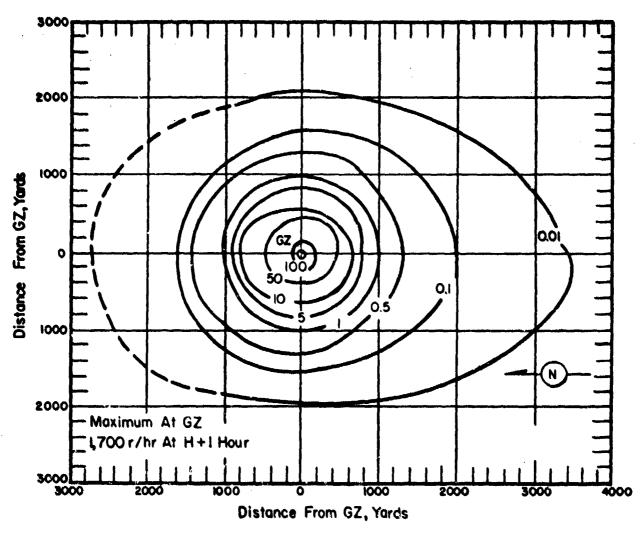


Figure 230 . Operation PLUMBBOB - Morgan.
On-site dose rate contours in r/hr at H+l hour.

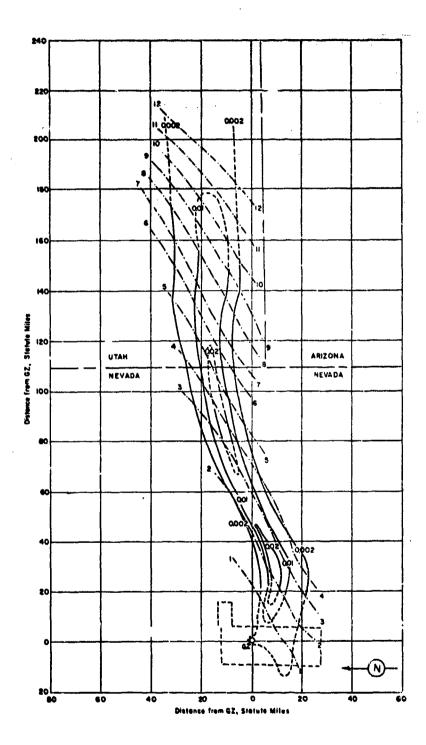


Figure 231. Operation PLUMBBOB - Morgan.
Off-site dose rate contours in r/hr at H+1 hour.

TABLE 70 NEVADA WIND DATA FOR OPERATION PLUMBBOB-

MORGAN

Altitude	H-Ilor		H+2 h		Altitude	H-h		H+2 h	
(MSL)	Dir	Speed	Dir	Speed	<u>(MSL)</u>	Dir	Speed	Dir	Speed
feet	degrees	mph	degrees	mph	i'eet	degrees	mph	degrees	mph
Surface	Calm	Ca lm	Calm	Calm	30,000	280	47	280	41
4,715(BI	н) 350	80			31,000	280	52		
5,000	350	12	350	12	32,000	280	51 -		
6,000	010	14	360	20	33,000	280	50		
7,000	020	09	010	17	34,000	280	-53		
8,000	010	05	030	80	35,000	270	55	270	39
9,000	320	09	020	06	36,000	270	54		
10,000	300	14	280	07	37,000	260	52		
11,000	300	14	-~-		38,000	260	51		
12,000	290	12	270	12	39,000	250	52		<b>**</b> ***
13,000	280	09			40,000	250	55	250	59
14,000	280	13	270	14	41,000	250	60		-
15,000	280	18	(270)	(16 <b>)</b>	42,000	260	59		
16,000	270	21	280	18	43,000	260	58		
17,000	270	24		-	44,000	260	58		
18,000	280	31	290	26	45,000	240	58	250	60
19,000	280	36			46,000	240	56		
20,000	270	35	270	30	47,000	240	53		
21,000	270	38							
22,000	270	41	~						
23,000	260	43	270	41					
24,000	260	45							
25,000	270	43	270	41					
26,000	270	41		~-					•
27,000	270	40							
28,000	270	41		•-					
29,000	280	45							

# NOTES:

- 1. Numbers in parentheses are estimated values.
- Tropopause height was 37,400 ft MSL at H-hour.
   Wind data was obtained from the Yucca weather station.
- At H-hour the surface air pressure was 869 mb, the temperature 7.3°C, the dew point -5.9°C and the relative humidity 38%.

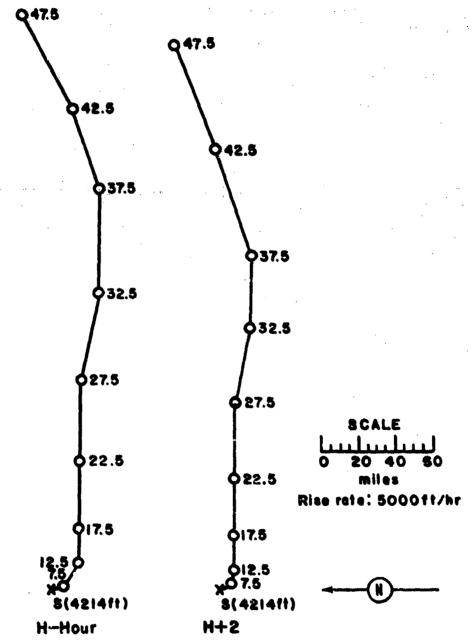
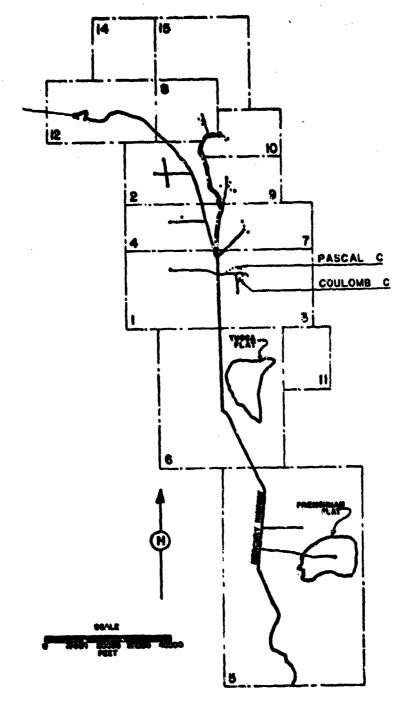


Figure 232. Hodographs for Operation PLUMBBOB -

Morgan.



NEVADA TEST SITE

Figure 233. Project 58 Shot Locations.

# 58 PROJECT - Pascal C Safety Experiment

PST CMT

DATE: 6 Dec 1957 6 Dec 1957

TIME: 1215 2015

Sponsor: LASL

SITE: MTS - Area 3e 37°03'N 116°01'50"W Site elevation: 4,035 ft

HEIGHT OF BURST: -250 ft

CLOUD TOP HEIGHT: 7,000 ft MSL CLOUD BOTTOM HEIGHT: NM

TYPE OF BURST AND PLACEMENT:
Subsurface burst in 36-inch diameter partially stemmed well. Device located at the bottom of a cased 200-ft hole with a 50-ft block of concrete above it and an open space up to a heavy concrete cap at the top.

REMARKS: Light on-site contemination was produced.

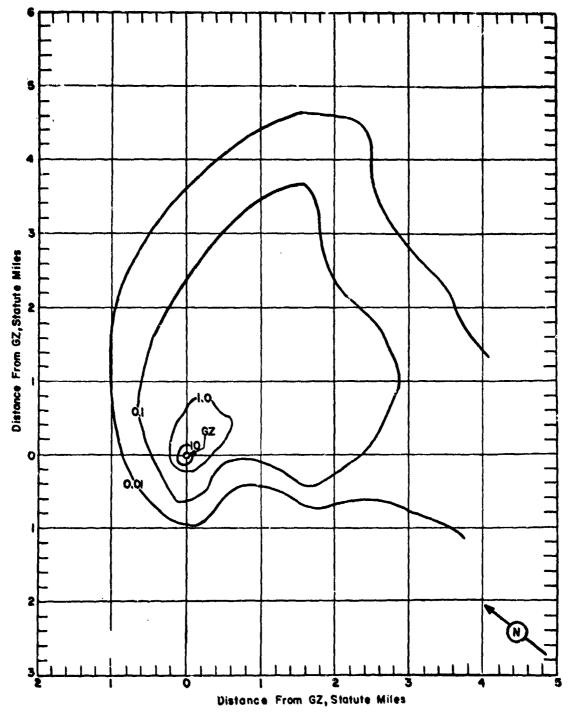


Figure 234. 58 Project - Pascal C. On-site dose rate contours in r/hr at H+l hour.

TABLE 71 NEVADA WIND DATA FOR OPERATION 58 PROJECT -

PASCAL-C

Altitude	H-hour			
(MSL)	Dir	Speed		
feet	degrees	mph		
Surface				
4,290	150	03		
4,790	180	07		
5,290	190	04		
5,790	240	02		
6,290	340	04 08		
6,790	310	80		
7,290	290	11		
7,790	300	14		
8,290	300	13		

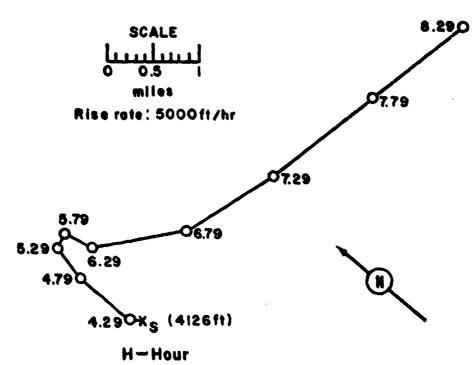


Figure 235. Hodograph for Operation 58 Project -

Pascal-C.

# 58 PROJECT - Coulomb C Safety Experiment

PST CMT

DATE: 9 Dec 1957 9 Dec 1957

TIME: 1200 2000

TOTAL YIELD: 0.5 kt

FIREBALL DATA:

Time to 1st minimum: NM
Time to 2nd maximum: NM
Radius et 2nd maximum: NM

CLOUD TOP HEIGHT: 13,000 ft MSL CLOUD BOTTOM HEIGHT: NM

Sponsor: LASL

SITE: NTS - Area 31 37° 02' 54" N 116° 01' 27" W Site elevation: 4,050 ft

HEIGHT OF BURST: Surface

TYPE OF EURST AND PLACEMENT:
Surface burst - Cab on Nevada
soil

CRATER DATA: NM

# REMARKS:

The fallout pattern was drawn from measurements made by a scientific project and is well defined and reliable.

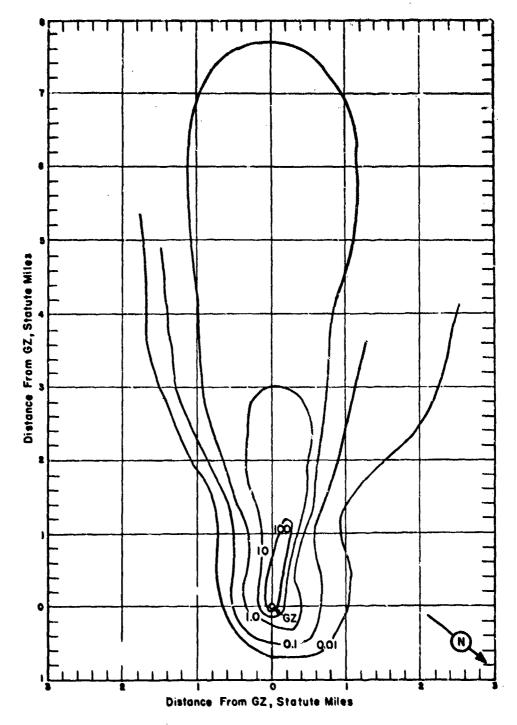


Figure 236. 58 Project - Coulomb-C. On-site dose rate contours in r/hr at H+1 hour.

TABLE 72 NEVADA WIND DATA FOR OPERATION 58 PROJECT -

COULOMB-C

Altitude	H-hou	r	
(MSL)	Dir	Speed	
feet	degrees	mph	
Surface			
5,000	030	11	
6,000	020	13	
7,000	020	07	
<b>8,0</b> 00	090	07	
9,000	050	04	
10,000	040	06	
11,000	120	03	
12,000	140	05	
13,000	150	13	
14,000	140	23	
15,000	140	18	
16,000	150	16	
17,000	170	14	
18,000	160	13	
19,000	140	09	
20,000	180	03	



Rise rate: 5000ft/hr

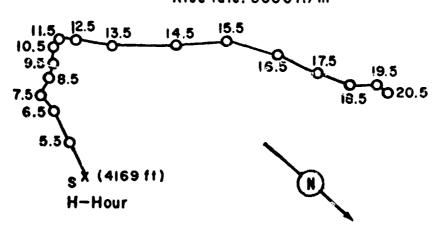


Figure 237. Hodograph for Operation 58 Project -

Coulomb-C.

58 PROJECT - Venus Safety Experiment

PST CMT Sponsor: UCRL 22 Feb 1958 23 Feb 1958

DATE: 22 Feb 1958 23 Feb 1958
TIME: 1700 0100 SITE: NTS - Area 12d 37° 11' 32" N 1.16° 11' 43" W

TYPE OF BURST AND PLACEMENT: Subsurface burst (Tunnel)

CLOUD TOP HEIGHT: NM
CLOUD BOTTOM HEIGHT: NM

HEIGHT OF BURST: -100 ft

58 PROJECT - Uranus Safety Experiment

PST

CMT

DATE:

14 Mar 1958 14 Mar 1958 1400 2200 TIME:

Sponsor: UCRL

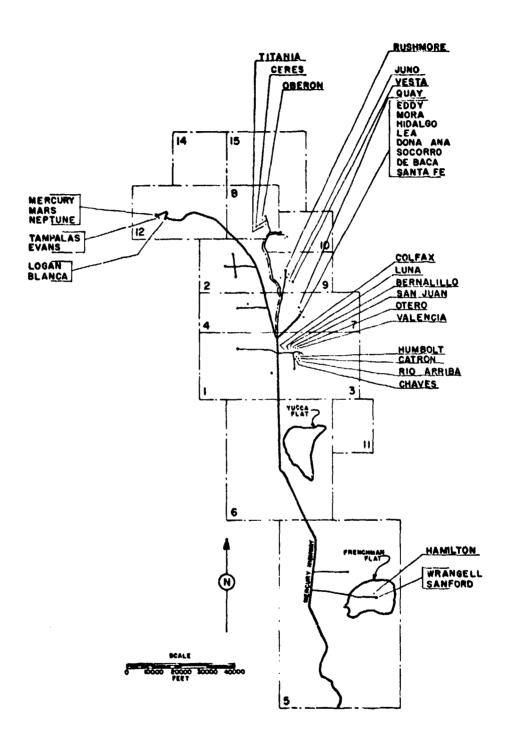
SITE: NTS - Area 12d

37° 11' 32" N 116° 11' 43" W

TYPE OF BURST AND PLACEMENT:
Subsurface burst (Tunnel)

CLOUD TOP HEIGHT: NM CLOUD BOTTOM HEIGHT: NM

HEIGHT OF BURST: -114 ft



NEVADA TEST SITE

3 million 1 mill

Figure 238. Operation HARDIACK II, Shot Locations.

# OPERATION MARDTACK II - Otero Safety Experiment

PDT GMT
12 Sep 1958 12 Sep 1958

TIME: 1300 2000

FISSION YIELD: 38 tons

FIREBALL DATA:

DATE:

Time to 1st minimum: NM
Time to 2nd maximum: NM
Radius at 2nd maximum: NM

CLOUD TOP HEIGHT: 9,000 ft MSL

CLOUD BOTTOM HEIGHT: NM

Sponsor: LASL

SITE: NTS Area 3q

37° 02' 60" N 116° 01' 55" W

Site elevation: 4,035 ft

HEIGHT OF BURST: -480 ft

TYPE OF BURST AND PLACEMENT:
Subsurface burst - deep well

CRATER DATA: Not available

## REMARKS:

The on-site fallout documentation was performed by the Radiological Safety Division of the Reynolds Electrical and Engineering Company for purposes of personnel safety. Readings were taken with AN/PDR 39 or Tracerlab SU-10 instruments at H+1 hour,  $H+3\frac{1}{2}$  hours, D+1 day, D+2 days and D+3 days. The portion of the pattern indicated by solid lines is fairly reliable. The dotted portion is only an approximation in the absence of measurements. The  $t^{-1\cdot2}$  decay approximation was used to extrapolate the dose-rate readings to H+1 hour.

The off-site fallout documentation was performed with Beckman MX-5 and AN/PDR 39 instruments by the U. S. Public Health Service for purposes of public safety. The portion of the pattern indicated by solid lines is fairly reliable. The  $t^{-1.3}$  decay approximation was used to extrapolate the dose-rate readings to H+l hour.

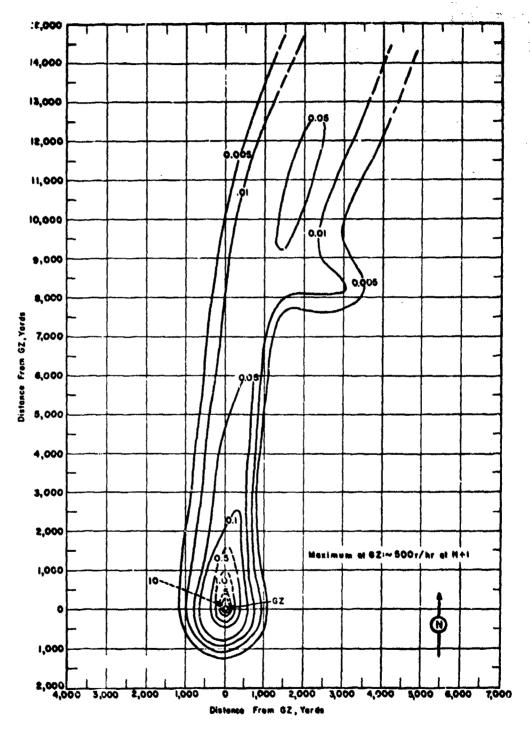


Figure 239. Operation HARDTACK II - Otero.
On-site dose rate contours in r/hr at H+l hour.

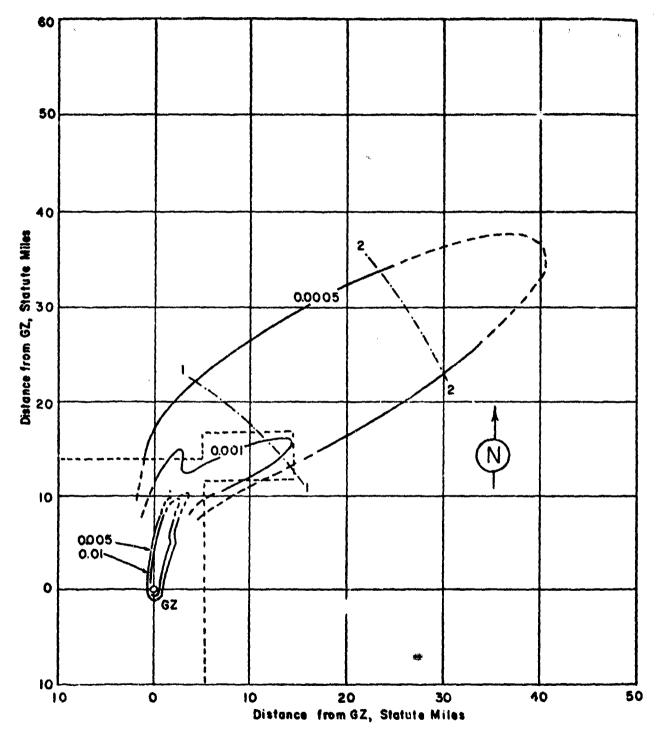


Figure 240. Operation HARDTACK II - Otero.
Off-site dose rate contours in r/hr at H+l hour.

TABLE 73 NEVADA WIND DATA FOR OPERATION HARDIACK II-

OTER

Altitude	H-ho	ur	
(MSL)	Dir	Speed	
feet	degrees	mph	
Surface	180	29	
5,000	180	31	
6,000	180	36	
7,000	180	38	
8,000	190	30	
9,000	200	28	
10,000	210	31	
11,000	510	47	
12,000	550	54	

NOTE: Wind data was obtained from the Yucca weather station.

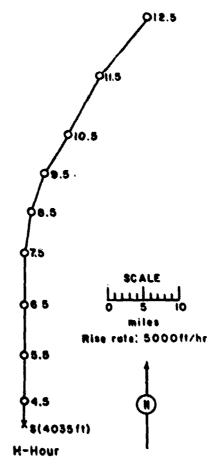


Figure 241. Hodograph for Operation HARDTACK II -

Otero.

# OPERATION HARDTACK II - Bernalillo Safety Experiment

PDT CMT

DATE: 17 Sep 1958 17 Sep 1958

TIME: 1230 1930

TOTAL YIELD: 15 tons

FIREBALL DATA:

Time to 1st minimum: NM
Time to 2nd maximum: NM
Radius at 2nd maximum: NM

CRATER DATA: Not available

Sponsor: LASL

SITE: NTS - Area 3n 37° 02' 58"

116° 01' 59" W

Site elevation: 4,030 ft

HEIGHT OF BURST: -456 ft

TYPE OF BURST AND PLACEMENT:
Subsurface burst - deep well

CLOUD TOP HEIGHT: 7,500 ft MSL CLOUD BOTTOM HEIGHT: 5,500 ft

MSL

# REMARKS:

The on-site fallout documentation was performed by the Radiological Safety Division of the Reynolds Electrical and Engineering Company for purposes of personnel safety. Readings were taken with AN/PDR 39 or Tracerlab SU-10 instruments at H+½ hour, H+3¼ hours, D+1 day, D+2 days and D+3 days. "The greater portion of this pattern was well documented and should be fairly reliable. The downwind extent of the 0.005 r/hr and 0.05 r/hr isolines was estimated in the absence of measurements."

The t-1.2 decay approximation was used to extrapolate the dose-rate readings to H+1 hour. No significant fallout was reported by the off-site monitors.

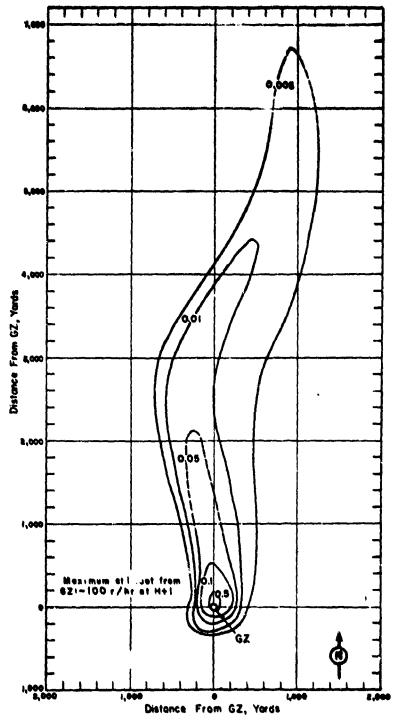


Figure 242. Operation HARDTACK II - Bernalillo. On-site dose rate contour: in r/hr at H+1 hour. 389

TABLE 74 NEVADA WIND DATA FOR OPERATION WARDTACK II -

BERNALILLO

Altitude	H-hour			
(MSL)	Dir	Speed		
feet	degrees	mph		
Surface	180	15		
5,000	180	23		
6,000	180	54		
7,000	500	50		
8,000	510	17		
9,000	510	17		
10,000	510	18		

NOTE: Wind data was obtained from the Yucca weather station.

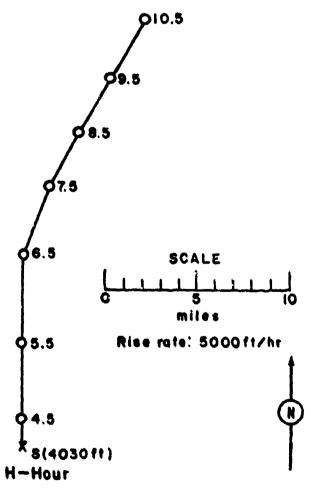


Figure 243. Hodograph for Operation HARDTACK II -

Bernalillo.

#### OPERATION IMPOINTMENT II -

## Eddy

 PDT
 CMT

 DATE:
 19 Sep 1958
 19 Sep 1958

 TIME:
 0700
 1400

TOTAL YIELD: 83 tons

FIREBAIL DATA:

Time to 1st minimum: NM
Time to 2nd maximum: NM
Radius at 2nd maximum: NM

CRATER DATA: No crater

Sponsor: LASL

SITE: NTS - Area 7b 37° 05' 12" N 116° 01' 25" W Site elevation: 4.186 ft

HEIGHT OF BURST: 500 ft

TYPE OF BURST AND PLACEMENT:
Air burst from balloon over
Nevada soil

CLOUD TOP HEIGHT: 11,000 ft MSL CLOUD BOTTOM HEIGHT: 7,500 ft MSL

# REMARKS:

The on-site fallout documentation was performed by the Radiological Safety Division of the Reynolds Electrical and Engineering Company for purposes of personnel safety. Readings were taken with AN/PDR-39 or Tracerlab SU-10 instruments at H+½ hour, H+6 hours, D+1 day, D+2 days, and D+3 days along eight radial roads. The sodium-24 decay rate was used to extrapolate the dose-rate readings to H+1 hour. This decay rate is not strictly applicable although it closely approximates the observed decay.

The off-site fallout documentation was performed with Beckman MX-5 and AN/PDR-39 instruments by the U. S. Public Health Service for purposes of public safety. Readings were taken at about 10-mile intervals except in populated places or when the lose rate varied considerably with distance. "The far northerly portion of the pattern may be in error. No airborne activity above background was recorded in this general area. The easterly portion of the pattern was interpolated. The rest of the pattern was well documented and should be fairly reliable."

The  $t^{-1/2}$  decay approximation was used to extrapolate the dose-rate readings to H+1 hours.

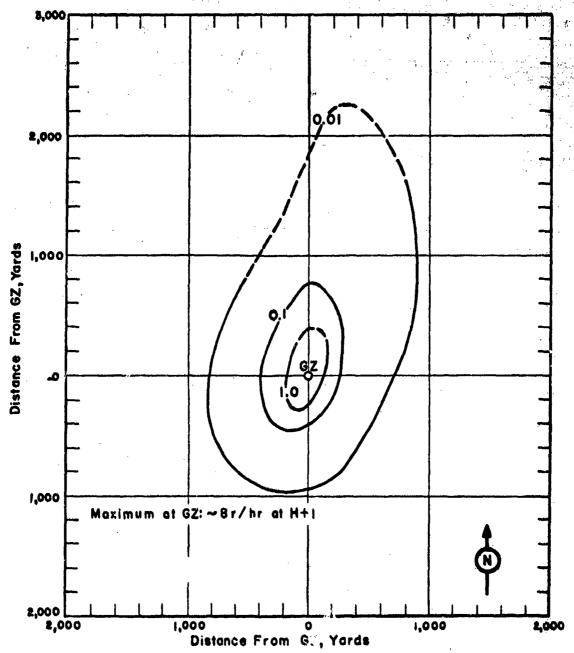


Figure 244. Operation HARDTACK II - Eddy.
On-site dose rate contours in r/hr at H+1 hour.

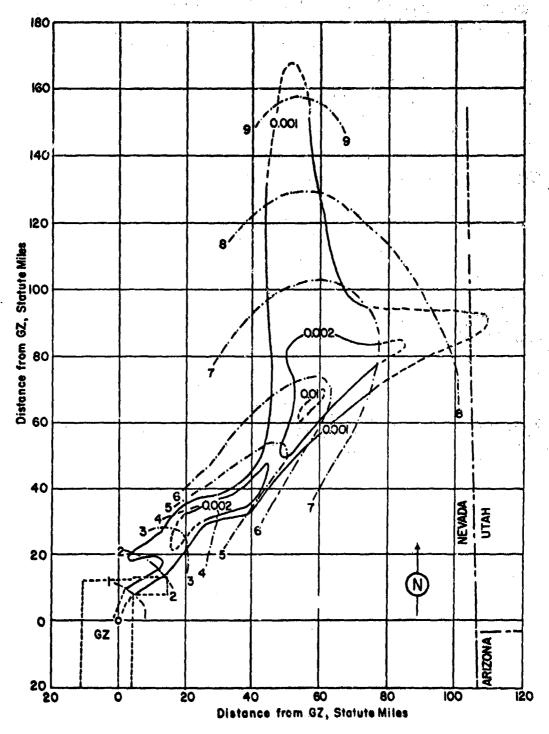


Figure 245. Operation HARDTACK II - Eddy.
Off-site dose rate contours in r/hr at H+1 hour.

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TABLE 75 NEVADA WIND DATA FOR OPERATION HARDTACK II-

-	_	_	•
L.	п		•

Altitude	H-hou	ır
(MSL)	Dir	Speed
feet	degrees	mph
Surface	Calm	Calm
5,000	240	08
6,000	210	13
7,000	510	13
8,000	\$10	14
9,000	210	14
10,000	190	13
11,000	180	10
12,000	170	06

#### NOTES:

- 1. Wind data was obtained from the Yucca weather station.
- 2. Tropopause height was 48,000 ft MSL.
- 3. The surface air pressure was 12.69 psi, the temperature 14.2°C, the dew point -7.9°C, and the relative humidity 21%.

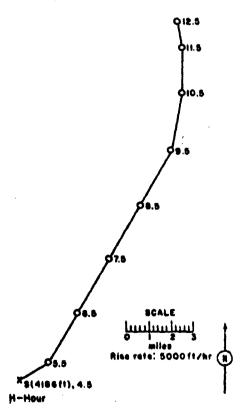


Figure 246. Hodograph for Operation HARDTACK II-

Eddy.

# OPERATION HARDTACK II - Luna Safety Experiment

PDT GMT
ATE: 21 Sep 1958 21 Sep 1958
IMM: 1200 1900

TOTAL YIELD: 1.5 tons

FIREBALL DATA:

Time to 1st minimum: NM
Time to 2nd maximum: NM
Radius at 2nd maximum: NM

CRATER DATA: Not available

Sponsor: IASL

SITE: NTS - Area 3m 37° 02' 57" N 116° 02' 01" W Site elevation: 4,031 ft

HEIGHT OF BURST AND PLACEMENT: Subsurface turst - 484 ft below surface in well

CLOUD TOP HEIGHT: NM CLOUD BOTTOM HEIGHT: NM

### RIMARKS:

The on-site fallout documentation was performed by the Radiological Safety Division of the Reynolds Electrical and Engineering Company for purposes of personnel safety. Readings were taken with AN/PDR-39 or Tracerlab SU-10 instruments at  $H+\frac{1}{2}$  hour, H+6 hours, D+1 day, D+2 days and D+3 days along eight radial roads. Since there were few readings in the area where fallout should have occurred based on the wind data it is difficult to draw a pattern with any confidence. The  $t^{-1.2}$  decay approximation was used to extrapolate the dose rate readings to H+1 hour.

There were no readings above background reported off-site.

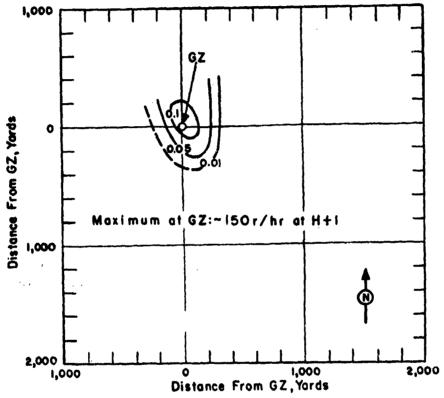


Figure 247. Operation HARDTACK II - Luna.
On-site dose rate contours in r/hr at H+l hour.

Altitude	H-hour		
(MSL)	Dir	Speed	
feet	degrees	mph	
Surface	160	05	
5,000	170	09	
6,000	130	10	
7,000	180	13	
<b>8,000</b> -	190	16	
9,000	190	51	

NOTE: Wind data was obtained from the Yucca weather station.

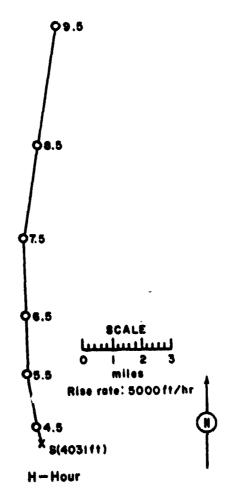


Figure 248. Hodograph for Operation HARDTACK II -

Luna.

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# OPERATION HARDIACK II - Mercury Safety Experiment

 PDT
 GMT

 DATE:
 23 Sep 1958
 23 Sep 1958

 TIME:
 1500
 2200

Sponsor: UCRL

SITE: NTS - Area 12f 37° 11' 35" N 116° 12' 02" W Site elevation: 6,720 ft

DEPTH OF BURST: 183 ft

TYPE OF BURST AND PLACEMENT:
Subsurface burst - Tunnel in
Nevada soil

CLOUD TOP HEIGHT: NM CLOUD BOTTOM HEIGHT: NM

## REMARKS:

Since there was essentially no nuclear yield, no venting into the atmosphere was observed. There was, however, some alpha contamination in the main tunnel.

# OPERATION HARDIACK II - Valencia Safety Experiment

Sponsor: LASL PDT

27 Sep 1958 26 Sep 1958 1300 2000

NTS - Area 3r 37° 02' 59" N 116° 01' 47" W TOTAL YIELD: 2 tons Site elevation: 4,033 ft

FIREBALL DATA:

HEIGHT OF BURST: -484 ft Time to 1st minimum: NM Time to 2nd maximum:

TYPE OF BURST AND PLACEMENT: Radius at 2nd maximum: NM Subsurface burst - Well in

Nevada soil CRATER DATA: Not available

#### REMARKS:

The on-site fallout documentation was performed by the Radiological Safety Division of the Reynolds Electrical and Engineering Company for purposes of personnel safety. Readings were taken with AN/PDR-39 or Tracerlab SU-10 instruments at II+1 hour, H+4 hours, D+1 day and D+2 days along eight radial roads. The documentation was such as to give a reliable pattern. The t-1.2 decay approximation was used to extrapolate the dose rate readings to H+1 hour.

No radiation intensities significantly above background were found by the off-site monitors.

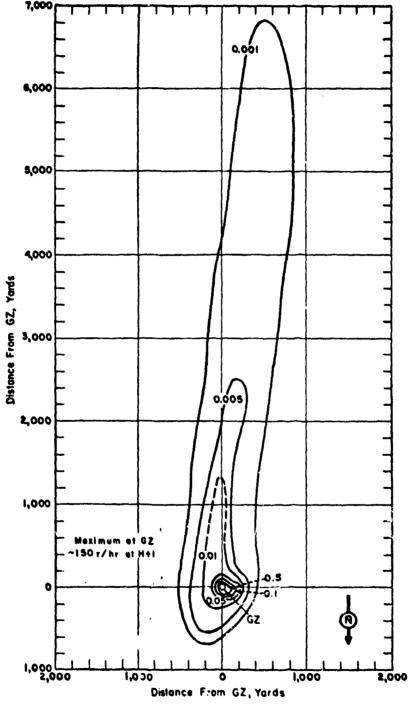


Figure 249. Operation HARDTACK II - Valencia. On-site dose rates in r/hr at H+1 hour.

TABLE 77 NEVADA WIND DATA FOR OPERATION HARDTACK II-

VALAMICTA

Altitude	H-hour		
(MSL)	Dir	Speed	
feet	degrees	mph	
Surface	20	17	
5,000	10	20	
6,000	20	21	
7,000	30	21	
8,000	30	20	

NOTE: Wind data was obtained from the Yucca weather station.

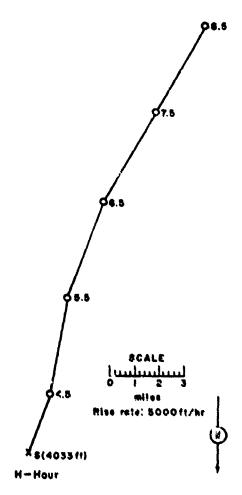


Figure 250. Hodograph for Greration HARDTACK II -

Valencia.

## OPERATION HARDTACK II - Mars Safety Experiment

PDT CMT

DATE: 27 Sep 1958 28 Sep 1958 TIME: 1700 0000

TOTAL YIELD: 13 tons

FIREBALL DATA:

Time to 1st minimum: NM
Time to 2nd maximum: NM
Radius at 2nd maximum: NM

CLOUD TOP HEIGHT: NM CLOUD BOTTOM HEIGHT: NM

Sponsor: UCRL

SITE: NTS - Area 12f.02

37° 11' 35" N 116° 12' 02" W

Site elevation: 6,720 ft

DEPTH OF BURST: 140 ft

TYPE OF BURST AND PIACEMENT:
Subsurface burst - Tunnel in

Nevada soil

## REMARKS:

The on-site fallout documentation was performed by the Radiological Safety Division of the Reynolds Electrical and Engineering Company for purposes of personnel safety. Readings were taken with AN/PDR-39 or Tracerlab SU-10 instruments at H+1 hour, D+1 day and D+3 days. ("The only road which could be monitored in the direction of fallout was the Area 12 access road; therefore, there is considerable uncertainty as to the cross-wind extent of this pattern.")

The down-wind and up-wind extent of the contamination should be fairly reliable. The  $t^{-1\cdot 2}$  decay approximation was used to extrapolate the dose-rate readings to H+1 hour.

No radioactivity above background was detected off-site.

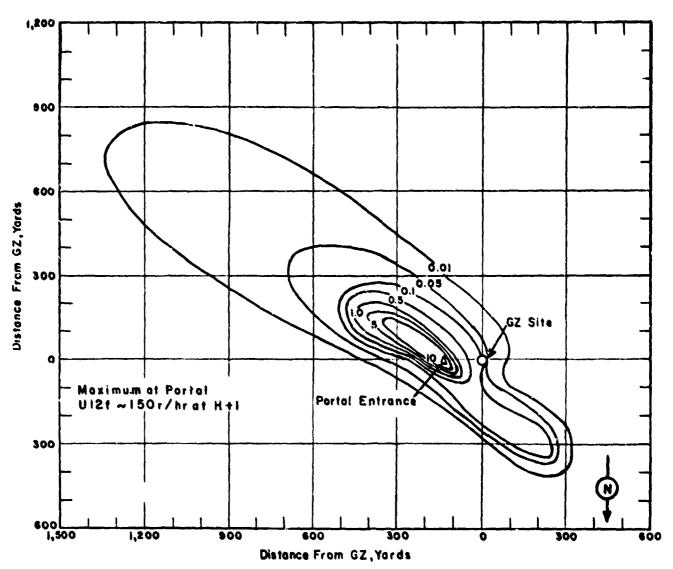


Figure 251. Operation HARDTACK II - Mars.
On-site dose rate contours in r/hr at H+l hour.

TABLE 78 NEVADA WIND DATA FOR OPERATION HARDTACK II - MARS

		SURFACE WI	NDS	
TIME	9 foot mesa Slope Tower		100 foot me Mountain To	
	(Elev. 6,72		(Elev. 7,46	5 ft MSL)
	Dir	Speed	Dir	Speed
	degrees	mph	degrees	mph
H-hour	040	2	50	07
H+1 hour	320	8	25	21
H+2 hours	330	6	35	51
H+3 hours	320	5	45	20

### OPERATION HARDTACK II -

#### Mora

PST CMT

DATE: 29 Sep 1958 29 Sep 1958

TIME: 0605 1405

TOTAL YIFLD: 2.0 kt

FIREBALL DATA:

Time to 1st minimum: NM
Time to 2nd maximum: NM
Radius at 2nd maximum: NM

CLOUD TOP HEIGHT: 18,500 ft MSL CLOUD BOTTOM HEIGHT: 10,000 ft MSL

Sponsor: LASL

SITE: NTS - Area 7b 37° 05' 12" N 116° 01' 25" W Site elevation: 4,186 ft

HEIGHT OF BURST: 1,500 ft

TYPE OF BURST AND PLACEMENT:
Air burst from balloon over
Nevada soil

CRATER DATA: No crater

## REMARKS:

The on-site fallout documentation was performed by the Radiological Safety Division of the Reynolds Electrical and Engineering Company for purposes of personnel safety. Readings were taken with AN/PDR-39 or Tracerlah SU-10 instruments at H+½ hour, H+5 hours, D+1 day, D+2 days and D+3 days along eight radial roads. At shot time a dust cloud was formed and was observed to move toward the west over the Mercury Highway producing some activity. Since this event was fairly well documented, there is considerable confidence in the pattern presented. The sodium-24 decay rate was used to extrapolate the dose-rate readings to H+1 hour. This decay Tate is not strictly applicable although it closely approximates the observed docay.

Only small areas of low level of radioactivity relative to background radiation were detected off site.

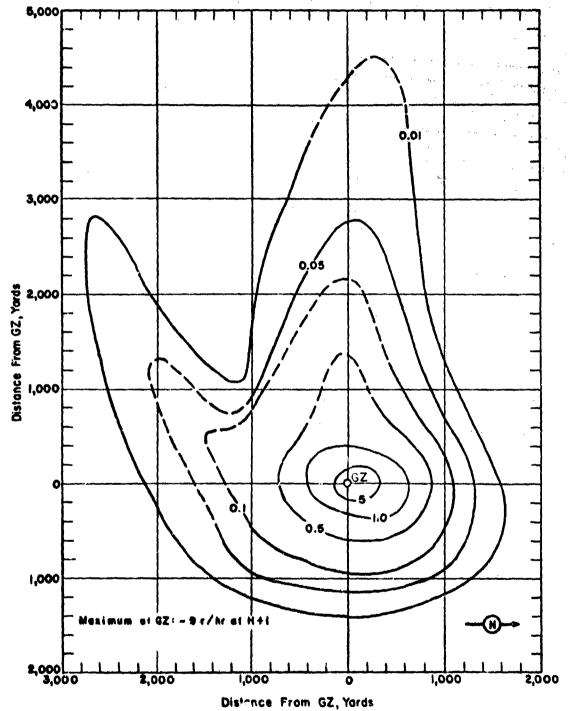


Figure 252. Operation HARDTACK II - Mora. On-site dose rate contours in r/hr at H+l hour.

Altitude	H-hour		
(MSL)	Dir	Speed	
feet	degrees	mph	
Surface	Calm	Calm	
5,000	320	02	
6,000	340	05	
7,000	360	09	
8,000	020	14	
9,000	030	15	
10,000	020	15	
11,000	010	15	
12,000	360	18	
13,000	350	22	
14,000	360	23	
15,000	010	24	
16,000	010	28	
17,000	010	51	
18,000	020	51 35	
19,000	020	36	
20,000	080	36	

#### NOTES:

- 1. Wind data was obtained from the Yucca weather station.
- 2. Tropopause height was 40,000 ft MSL.
- 3. The surface air pressure was 12.68 psi, the temperature 11.8°C, the dew point 6.5°C, and the relative humidity 70%.

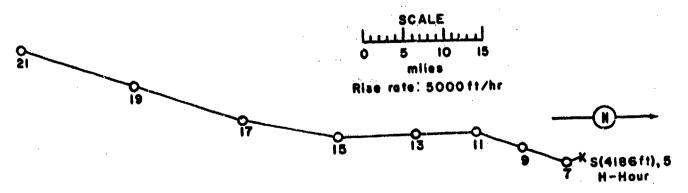


Figure 253. Hodograph for Operation HARDTACK II -

Mora.

# OPERATION HARDTACK II - Hidalgo Safety Experiment

PST CMT

DATE: 5 Oct 1958 5 Oct 1958

TIME: 0610 1410

TOTAL YIELD: 77 tons.

FIREBALL DATA:

Time to 1st minimum: NM
Time to 1st maximum: NM
Radius at 2nd maximum: NM

CRATER DATA: No crater

Sponsor: LASI

SITE: NTS - Area 7b 37° 05' 12" N 116° 01' 25" W Site elevation: 4,186 f

HEIGHT OF BURST: 377 ft

TYPE OF BURST AND PLACEMENT:

Air burst from balloon over
Nevada soil

CLOUD TOP HEIGHT: 12,000 ft MSL CLOUD BOTTOM HEIGHT: 8,000 ft MSL

#### REMARKS:

The on-site fallout documentation was performed by the Radiological Safety Division of the Reynolds Electrical and Engineering Company for purposes of personnel safety. Readings were taken with AN/PDR-39 or Tracerlab SU-10 instruments at H+3 hours, H+8 hours, D+1 day, D+2 days and D+3 days along eight radial roads. The sodium-24 decay rate was used to extrapolate the dose-rate readings to H+1 hour. This decay rate is not strictly applicable although it closely approximates the observed decay.

The initial off-site survey did not reveal any activity above background. Approximately 24 hours after shot time, readings in the Hiko-Alamo-Caliente area indicated activity 2 to 4 times background levels.

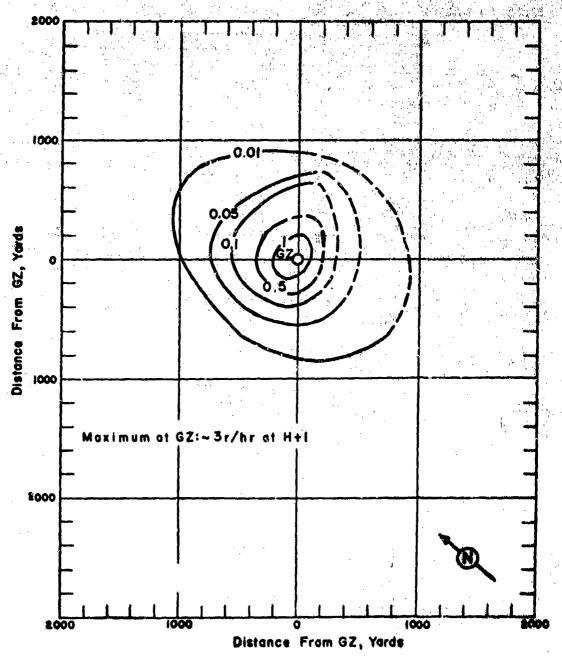


Figure 254. Operation HARDTACK II - Hidalgo.
On-site dose rate contours in r/hr at H+1 hour.

TABLE 80 NEVADA WIND DATA FOR OPERATION HARDTACK II -

HT DAT CO

Altitude	H-hour		H+2 hours	
(MSL)	Dir	Speed	Dir	Speed
feet	degrees	mph	degrees	шбр
Surface	040	01	110	02
5,000	300	06	200	06
6,000	240	12	520	13
7,000	230	15	230	16
8,000	260	07	250	15
9,000	270	05		
10,000	220	06		
11,000	200	06		
12,000	160	07		

NOTE: Wind data was obtained from the Yucca weather station.

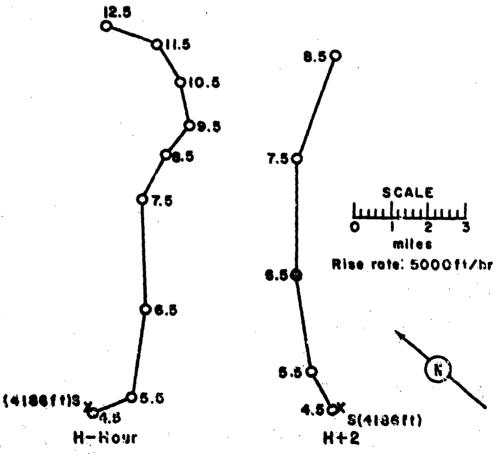


Figure 255. Hodographs for Operation HARDTACK II -

Hidalgo.

## OPERATION HARDTACK II - Colfax Safety Experiment

PST CMT
DATE: 5 Oct 1958 5 Oct 1958
TIME: 0815 1615

TOTAL YIELD: 5.5 tons

FIREBALL DATA:

Time to 1st minimum: NM
Time to 2nd maximum: NM
Radius at 2nd maximum: NM

CLOUD TOP HEIGHT: 5,500 ft MSL CLOUD BOTTOM HEIGHT: 4,500 ft MSL

Sponsor: LASL

SITE: NTS - Area 3k 37° 02' 56"

1160 05, 03. A

Site elevation: 4,033 ft

HEIGHT OF BURST: -350 ft

TYPE OF BURST AND PLACEMENT: Subsurface burst - Well in Nevada soil

CRATER DATA: Not available

#### REMARKS:

The on-site fallout documentation was performed by the Radiological Safety Division of the Reynolds Electrical and Engineering Company for purposes of personnel safety. Readings were taken with AN/PDR-39 or Tracerlab SU-10 instruments at  $H^{+\frac{1}{2}}$  hour,  $H^{+}6$  hours,  $D^{+}1$  day and  $D^{+}2$  days. The  $t^{-1\cdot 2}$  decay approximation was used to extrapolate the dose-rate readings to  $H^{+}1$  hour. There was insufficient monitoring information from which to draw a complete pattern.

No off-site fallout.

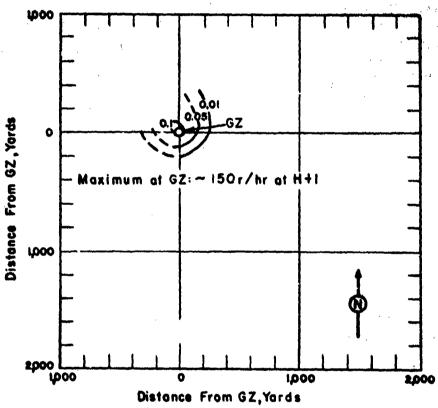


Figure 256. Operation HARDTACK II - Colfax.
On-site dose rate contours in r/hr at H+l hour.

TABLE 81 NEVADA WIND DATA FOR OPERATION HARDTACK II-

COLTAX

Altitude	H-hour		
(MSL)	Dir	Speed	
feet	degrees	mbp	
Surface	110	02	
5,000	200	06	
6,000	220	13	
7,000	230	16	
8,000	250	. 15	

NOTE: Wind data was obtained from the Yucca weather station.

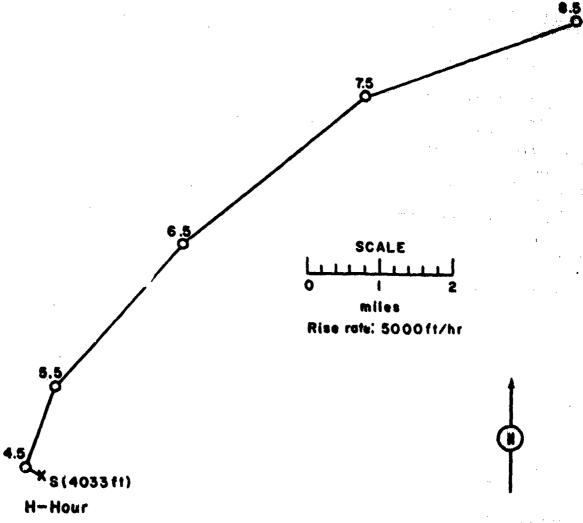


Figure 257. Hodograph for Operation HARDDACK II -

Colfax.

#### OPERATION HARDTACK II -

#### Tamalpais

PST CMI

DATE: 8 Oct 1958 8 Oct 195

TOTAL YIELD: 72 tons

FIREBALL DATA:

Time to 1st minimum: NM
Time to 2nd maximum: NM
Radius at 2nd maximum: NM

CRATER DATA: Not available

Sponsor: UCRL

BITE: NTS - Alea 125.02 37° 11' 43" N 116° 12' 01" W

Site elevation: 6,650 ft

HEIGHT OF BURST: Vertical depth
407 ft. Slant distance to
nearest surface 330 ft

HEIGHT OF BURST AND PLACEMENT:
Subsurface burst - Tunnel in
Nevada soil

CLOUD TOP HEIGHT: NM CLOUD BOTTOM HEIGHT: NM

#### REMARKS:

The on-site fallout documentation was performed by the Radiological Safety Division of the Reynolds Electrical and Engineering Company for purposes of personnel safety. Readings were taken with AN/PDR-39 or Tracerlab SU-10 instruments at H+1 hour. No extrapolation for decay was necessary. There was only a minor amount of venting through the tunnel mouth. A channeling effect due to the canyon transported the debris toward the southeast. The pattern presented is very uncertain.

No activity above background was detected off-site.

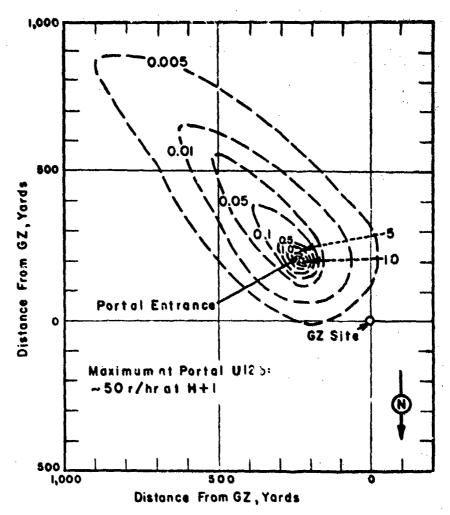


Figure 258. Operation HARDTACK II - Tamelpais.
On-site dose rate contours in r/hr at H+l hour.

TABLE 82 NEVADA WIND DATA FOR OPERATION HARDTACK II-

TAMALPAIS

		SURFA	CE WINDS	
TIME	9 foot N Slope To (Elev. 6 ft MSL)	wer	100 foot Mountain (Elev. 7 MSL)	Tower
	Dir S	peed	Dir	Speed
	degrees	mph	degrees	mph
H-hour	360	9	270	17
H+1 hour	360 360 360	9	280	17
H+2 hours	360	6	270	18

#### OPERATION HARDTACK II -

Quay

DATE: 10 Oct 1958 10 Oct 1958 TIME: 0630 1430

TOTAL YIELD: 79 tons

FIREBALL DATA:

Time to 1st minimum: NM
Time to 2nd maximum: NM
Radius at 2nd maximum: NM

CRATER DATA: No crater

Sponsor: LASL

SITE: MTS - Area 7c 37° 05' 41" N 116° 01' 25" W Site elevation: 4,249 ft

HEIGHT OF BURST: 100 ft

TYPE OF BURST AND PLACEMENT:
Tower burst over Nevada soil

CLOUD TOP HEIGHT: 10,000 ft MSL CLOUD BOTTOM HEIGHT: 7,500 ft MSL

#### REMARKS:

The on-site fallout documentation was performed by the Radiological Safety Division of the Reynolds Electrical and Engineering Company for purposes of personnel safety. Readings were taken with AN/PDR-39 or Tracerico SU-10 instruments at H+1 hour, H+6 hours, D+1 day and D+2 days along eight radial roads. The t-1.2 decay approximation was used to extrapolate the dose-rate readings to H+1 hour. The fallout was well documented and the pattern is considered fairly reliable.

The off-site fallout documentation was performed with Beckman MX-5 and AN/PDR-39 instruments by the U. S. Public Health Service for purposes of public safety. Readings were taken at about 10-mile intervals except in populated places or when the dose rate varied considerably with distance. The t-1.2 decay approximation was used to extrapolate the dose-rate readings to H+1 hour. Since this event was well documented, the pattern is considered to be reliable.

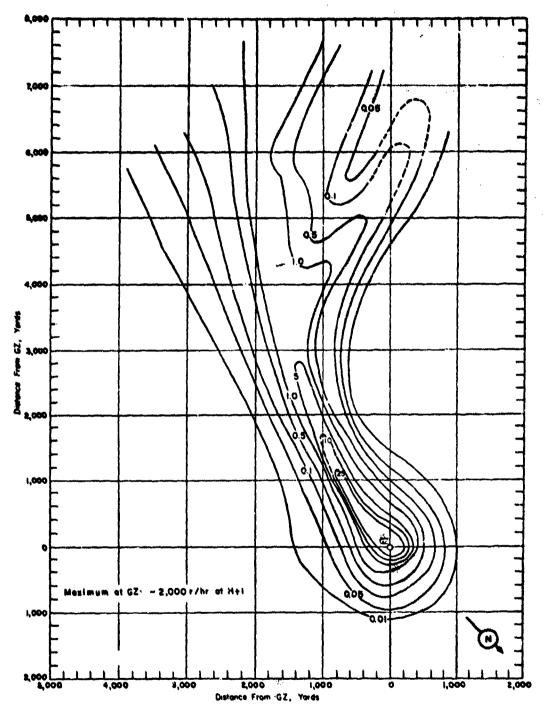


Figure 259. Operation HARDTACK II - Quay.
On-site dose rate contours in r/hr at H+1 hour.

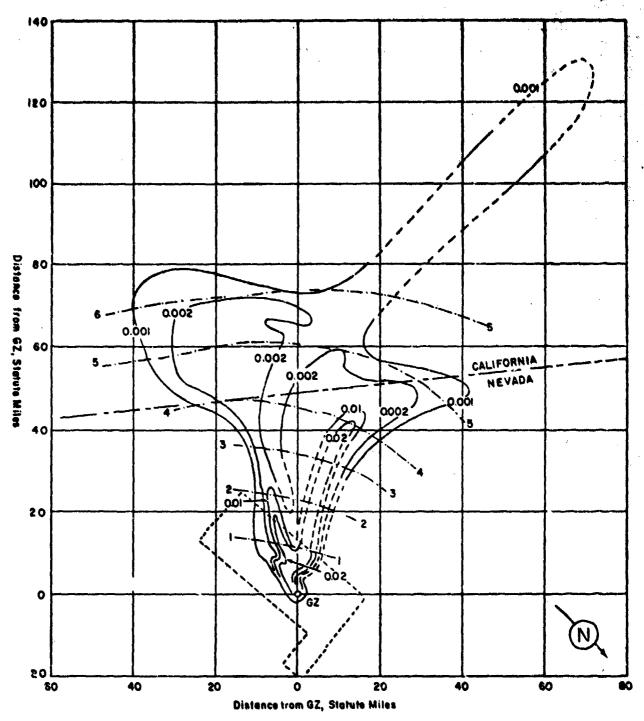


Figure 260. Operation HARDTACK II - Quay.
Off-site dose rate contours in r/hr at H+1 hour.

Altitude	H-hou	r	
(MSL)	Dir	Speed mph	
feet	degrees		
		ym ei trogen	
Surface	300	08	
5,000	020	. 18	
6,000	030	52	
7,000	040	22	
8,000	070	14	
9,000	090	09	
10,000	060	15	
11,000	050	13	
12,000	020	05	

#### NOTES:

- 1. Wind data was obtained from the Yucca weather station.
- 2. The surface air pressure was 12.70 psi, the temperature 15.3°C, the dew point 2.7°C, and the relative humidity 29%.

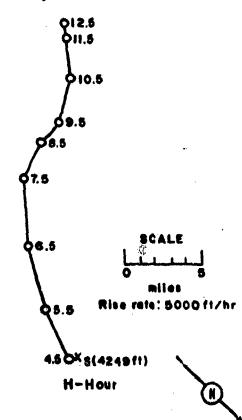


Figure 261. Hodograph for Operation HARDTACK II -

Ottov

## OPERATION HARDTACK II -

Les

PST CMT

DATE: 13 Oct 1958 13 Oct 1958

TIME: 0520 1320

TOTAL YIELD:

FIREBALL DATA:

Time to 1st minimum: NM
Time to 2nd maximum: NM
Radius at 2nd maximum: NM

CRATER DATA: No crater

Sponsor: LASL

37° 05' 12" W 116° 01' 25" W Site elevation: 4,186 ft

HEIGHT OF BURST: 1,500 ft

TYPE OF BURST AND PLACEMENT:
Airburst from balloon over
Nevada soil

CLOUD TOP HEIGHT: 17,000 ft MSI CLOUD BOTTOM HEIGHT: 12,000 ft

#### REMARKS:

The on-site fallout documentation was performed by the Radiological Safety Division of the Reynolds Electrical and Engineering Company for purposes of personnel safety. Readings were taken with AN/PDR-39 or Tracerlab SU-10 instruments at H+2 hour, H+6 hours, D+1 day and D+2 days along eight radial roads. The sodium-24 decay rate was used to extrapolate the dose-rate readings to H+1 hour. This decay rate is not strictly applicable although it closely approximates the observed decay.

The off-site fallout documentation was performed with Beckman MX-5 and AN/PDR-39 instruments by the U.S. Public Health Service for purposes of public safety. Readings were taken at about 10-mile intervals except in populated places or when the dose rate varied considerably with distance. The t-1.2 decay approximation was used to extrapolate the dose-rate readings to H+1 hour. The pattern is not reliable.

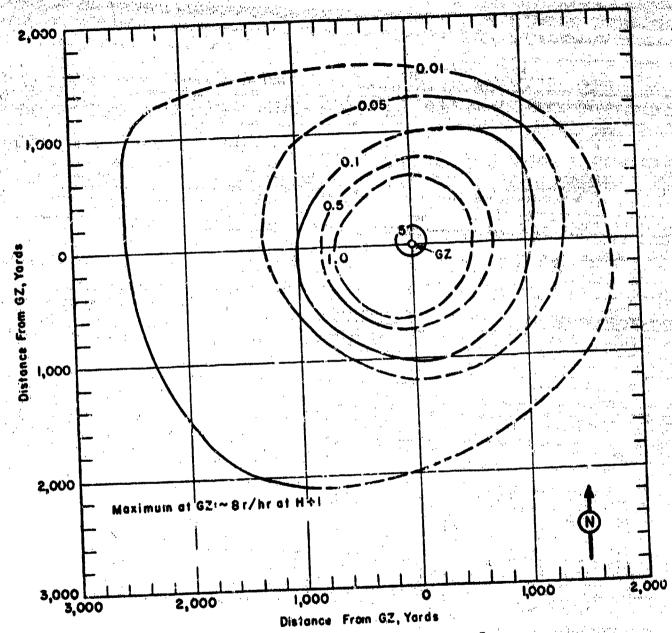


Figure 262. Operation HARDTACK II - Lea.
On-site dose rate contours in r/hr at H+l hour.

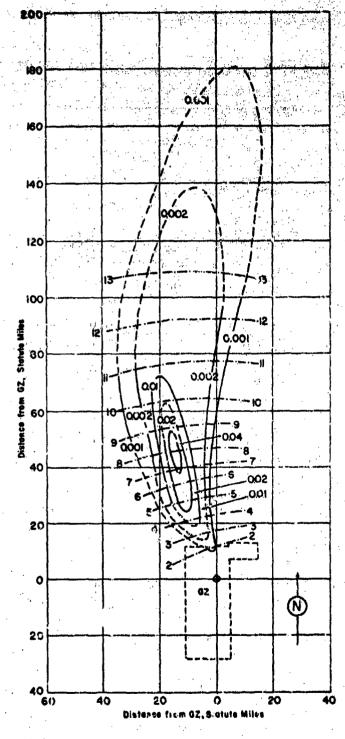


Figure 263. Operation HARDTACK II - Lea.
Off-site dose rate contours in r/hr at H+1 hour.

Altitude	H-hour		
(MSL)	Dir	Speed	
feet	degrees	mph	
Surface	200	01	
5,000	330	03	
6,000	170	03	
7,000	180	09	
8,000	190	10	
9,000	200	09	
10,000	190	10	
11,000	170	09	
12,000	150	07	
13,000	130	05	
14,000	110	03	
15,000	080	03	
16,000	020	06	
17,000	360	12	
18,000	360	14	
19,000	350	14	
20,000	360	16	

## NOTES:

- Wind data was obtained from the Yucca weather station. The surface air pressure was 12.73 psi, the temperature 13.4°C, the dew point 4.3°C, and the relative humidity 29%.

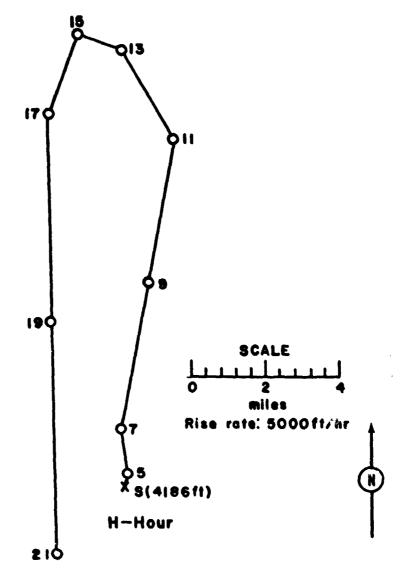


Figure 264. Hodograph for Operation HARDTACK II -

Lea.

### OPERATION HARDIACK II - Neptune Safety Experiment

PST GMT

DATE: 14 Oct 1958 14 Oct 1958

TIME: 1000 1800

TOTAL YIELD: 115 tons

FIREBALL DATA:

Time to 1st minimum: NM
Time to 2nd maximum: NM
Radius at 2nd maximum: NM

CRATER DATA:

Mean Diameter: 200 ft Maximum Depth: 35 ft

Crater located on a 30° slope

Sponsor: UCRL

SITE: NTS - Area 12c.03 37° 11' 38" N 116° 11' 59" W Site elevation: 6,800 ft

height of BURST: -98.5 ft
below a 30° slope. Vertical
distance to the surface 110 gt

TYPE OF BURST AND PLACEMENT:
Subsurface burst - Tunnel in
Nevada soil (bedded tuff)

CLOUD TOP HEIGHT: 11,000 ft MSL CLOUD BOTTOM HEIGHT: NM

## REMARKS:

The on-site fallout documentation was performed by the Radiological Safety Division of the Reynolds Electrical and Engineering Company for purposes of personnel safety. Readings were taken with  $\Lambda N/PDR-39$  or Tracerlab SU-10 instruments. The t<sup>-1.2</sup> decay approximation was used to extrapolate the dose-rate readings to H+1 hour. The Neptune explosion vented through the mesa slope at an elevation of about 6,800 feet. The pattern is considered fairly reliable.

No activity above background levels was reported off site.

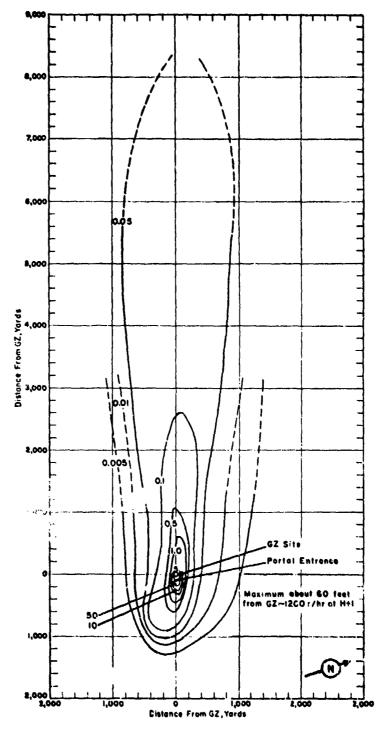


Figure 265. Operation HARDTAC TT. Neptune.
On-site dose rate tours in r/hr at H+1 hour.

TABLE 85 NEVADA WIND DATA FOR OPERATION HARDTACK II-

NEPTUNE

Altitude	H-hour		
(MSL)	Dir	Speed	
feet	degrees	mbp.	
Surface	060	02	
5,000	080	03	
6,000	110	07	
7,000	150	09	
8,000	160	o <b>8</b>	
9,000	150	08	
10,000	130	12	
11,000	140	13	
12,000	150	13	

NOTE: Vind data was obtained from the Yucca weather station.

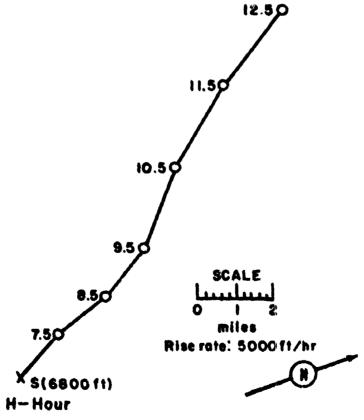


Figure 266. Hodograph for Operation HARDTACK II -

Neptune.

#### Hamilton

PST CMT

DATE: 15 Oct 1958 15 Oct 1958

TIME: 0800 1600

TOTAL YIELD: 1.2 tons

FIREBALL DATA:

Time to 1st minimum: NM
Time to 2nd maximum: NM
Radius at 2nd maximum: NM

CRATER DATA: No crater

Sponsor: UCRL - DOD

SITE: NTS - Area F1 36° 48' 08" 1

115° 55; 56" W Site elevation: 3,080 ft

HEIGHT OF BURST: 50 ft

TYPE OF BURST AND PLACEMENT:
Tower burst over Nevada soil

CLOUD TOP HEIGHT: 6,000 ft MSL.
CLOUD BOTTOM HEIGHT: 4,500 ft MSL.

#### REMARKS:

The close-in fallout documentation was performed by the First Radiological Safety Support Unit. Measurements were made with AN/PDR-39 instruments along 12 equally spaced radial lines with GZ at the center. Survey points were determined by stakes placed at 100 yd intervals on each line out to 800 yd. The experimental field gamma-decay curves were utilized to construct the H+1-hour dose-rate contours. The field gamma dose-rate decay curves indicated the presence of significant fission-product contamination. The gamma dose-rate at H+1 hour from the neutron - induced activity was estimated to be from 20% to 30% of the total dose rate. The pattern presented is reliable. The downward extent of the .01 r/hr contour shown in figure 445 is uncertain but the rest of the pattern is considered to be reliable.

The off-site fallout documentation was performed with Beckman MX-5 and AN/PDR-39 instruments by the U. S. Public Health Service for purposes of public safety. "The pattern was relatively well documented and is consistent with the wind analysis" (Reference 138). The  $t^{-1.2}$  decay approximation was used to extrapolate the dose-rate readings to H+1 hour.

The alpha contamination pattern was obtained from survey readings taken with Eberline 3G instruments.

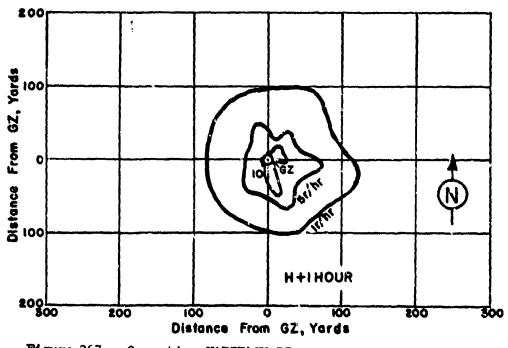


Figure 267. Operation HARDTACK II - Hamilton. On-site dose rate contours in r/hr at H+l hour.

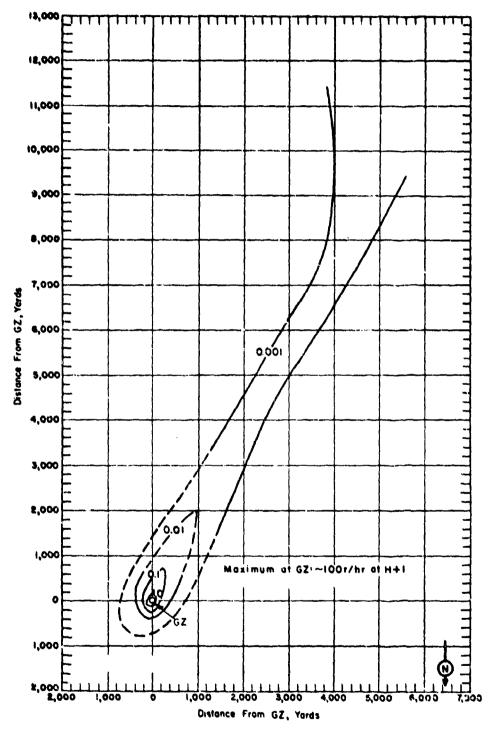


Figure 268. Operation HARDTACK II - Hamilton. On-site dose rate contours in r/hr at H+1 hour.

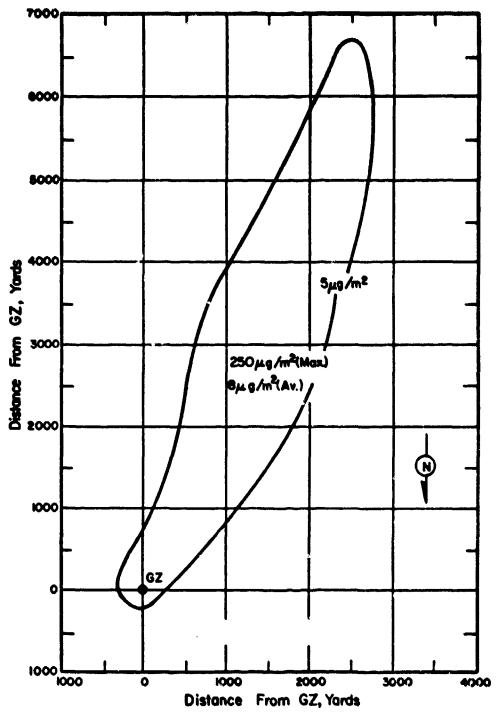


Figure 269. Operation HARDTACK II - Hamilton.

Alpha contamination in micrograms per square meter.

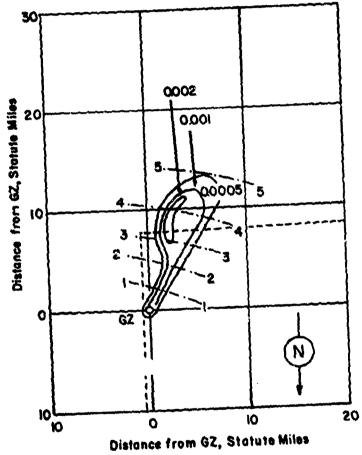


Figure 270. Operation HARDTACK II - Hamilton.
Off-site dose rate contours in r/hr at H+1 hour.

TABLE 86 NEVADA WIND DATA FOR OPERATION HARDTACK II

HAMILTON

Altitude	H-hc	ur	H+2 h	ours	H+5 h	ours
(MSL)	Dir	Speed	Dir	Speed	Dir	Speed
feet	degrees	mph	degrees	mph	degrees	mph
Surface	Calm	Calm	Calm	Calm	010	03
4,000	360	01	360	02	150	05
5,000	020	02	030	03	050	04
6,000	100	03	060	04	110	03
7,000	160	06			~~…	
8,000	180	80			***	

NOTE: Wind data was obtained from the Yucca weather station and may not be representative of the winds at Frenchman's Flat.

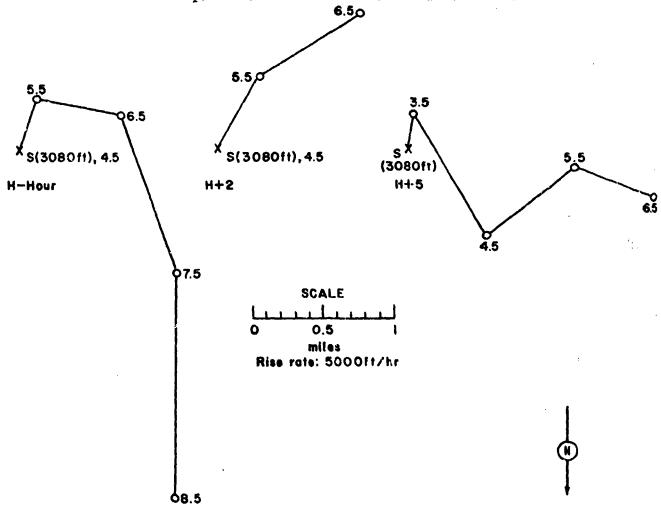


Figure 271. Hodographs for Operation HARDTACK II -

Hamilton.

#### Logan

PST CMT

15 Oct 1958 16 Oct 1958

TIME: 2200 0600

TOTAL YIELD: 5.0 kt

Sponsor: UCRL

SITE: NTS - Area 12e.02 37° 11' 03" N 116° 12' 04" W Site elevation: 6,140 ft

HEIGHT OF BURST: -830 ft
slant distance. Vertical depth
932 ft

FIREBALL DATA:

Time to 1st minimum: NM

Time to 2nd maximum: NM

Radius at 2nd maximum: NM

TYPE OF BURST AND PLACEMENT:
Subsurface burst - Tunnel in
Nevada soil

CRATER DATA: Not available

# REMARKS:

The Logan burst was completely contained and therefore no radiation from this explosion was released into the air.

#### Dona Ana

PST GMT

DATE: 16 Oct 1958 16 Oct 1958

TIME: 0620 1420

TOTAL YIELD: 37 tons

FIREBALL DATA:

Time to 1st minimum: NM
Time to 2nd maximum: NM
Radius at 2nd maximum: NM

CRATER DATA: No crater

Sponsor: LASL

SITE: NTS - Area 7b 37° 05' 12" N

11.6° 01' 25" W

Site elevation: 4,186 ft

HEIGHT OF BURST: 450 ft

TYPE OF BURST AND PLACEMENT:
Air burst from balloon over

Nevada soil

CLOUD TOP HEIGHT: 11,000 ft MSL CLOUD BOTTOM HEIGHT: 6,500 ft MSL

#### REMARKS:

The on-site fallout documentation was performed by the Radiological Safety Division of the Reynolds Electrical and Engineering Company for purposes of personnel safety. Readings were taken at H+½ hour, H+8 hours and D+1 day along eight radial roads. The pattern is not reliable since the down sind extent of most of the isodose lines is not known and the area to the east of ground zero was not monitored. The sodium-24 decay rate was used to extrapolate the dose-rate readings to H+1 hour. This decay rate is not strictly applicable although it approximates the observed decay.

The off-site fallout documentation was performed with Beckman MX-5 and AN/PDR-39 instruments by the U.S. Public Health Service for purposes of public safety. The pattern as drawn is not considered to be very reliable because of the uncertainties in dealing with activity only two or three times the background value. The total decay approximation was used to extrapolate the dose-rate readings to H+1 hour.

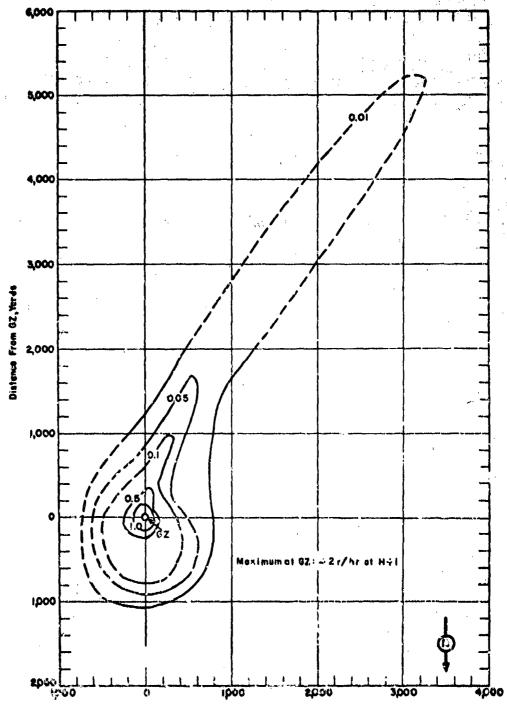
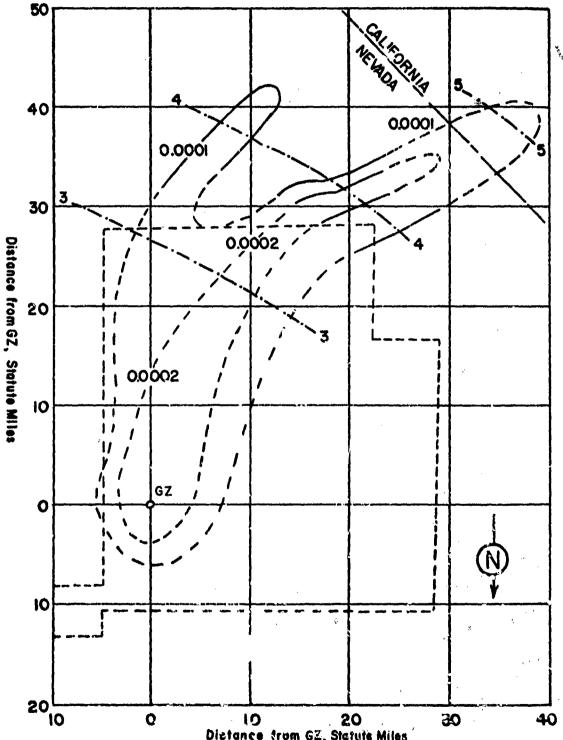


Figure 272. Cperation HARDTACK II - Dona Ana.
On-site dose rate contours in r/hr at H+1 hour.



Distance from GZ, Statute Miles

Figure 273. Operation HARDTACK II - Dona Ara.

Off-site dose rate contours in r/hr at K+1 hour.

Altitude	H-hou	H-hour	
(MSL)	Dir	Speed	
feet	degrees	mph	
Surface	360	02	
_			
5,000	020	09	
6,000	030	10	
7,000	040	07	
8,000	080	03	
9,000	140	05	
10,000	140	07	
11,000	140	09	
12,000	140	07	

#### NOTES:

- 1. Wind data was obtained from the Yucca weather station.
- 2. Tropopause height was 49,000 ft MSL.
- 3. The surface air pressure was 12.76 psi, the temperature 13.7°C, the dew point -2.7°C, and the relative humidity 32%.

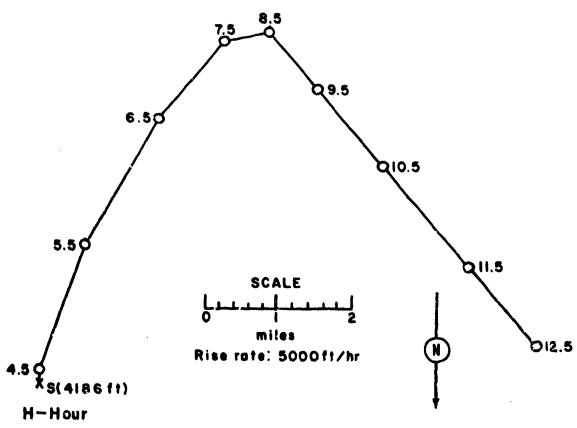


Figure 274. Hodograph for Operation NARDTACK II -

Dona Ana.

Marie Carlotte Committee C

# OPERATION HARDTACK II - Vesta Safety Experiment

PST CMT

DATE: 17 Oct 1958 17 Oct 1958

TIME: 1500 2300

TOTAL YIELD: 24 tons

FIREBALL DATA:

Time to 1st minimum: NM
Time to 2nd maximum: NM
Radius at 2nd maximum: NM

CRATER DATA: Not available

Sponsor: UCRL

SITE: NTS - Area 9e 37° 07' 21" N 116° 02' 05" W Site elevation: 4,226 ft

HEIGHT OF BURST: Zero ft

TYPE OF BURST AND PLACEMENT:
Surface burst in wooden
building with 20 ft of
gravel over the building

CLOUD TOP HEIGHT: 10,000 ft MSL CLOUD BOTTOM HEIGHT: NM

#### REMARKS:

The on-site fallout documentation was performed by the Radiological Safety Division of the Reynolds Electrical and Engineering Company for purposes of personnel safety. Readings were taken with AN/PDR-39 or Tracerlab SU-10 instruments at  $H+l\frac{1}{2}$  hours, D+1 day and D+2 days. The pattern was well documented and should be reliable. The  $t^{-1.2}$  decay approximation was used to extrapolate the dose-rate readings to H+1 hour.

The off-site fallout documentation was performed with Beckman MX-5 and AN/PDR-39 instruments by the U. S. Public Health Service for purposes of public safety. The fallout pattern is considered rather uncertain, since there were few radiation measurements. The  $t^{-1.2}$  decay approximation was used to extrapolate the doserate readings to H+1 hour.

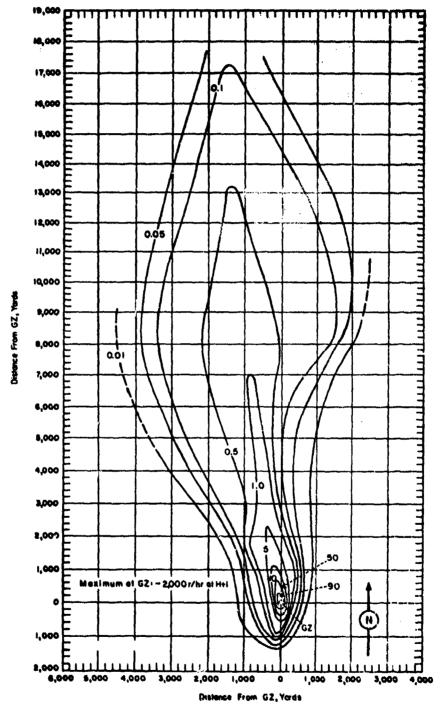


Figure 275. Operation HARDTACK II - Vesta.
On-site dose rate contours in r/hr at H+l hour.

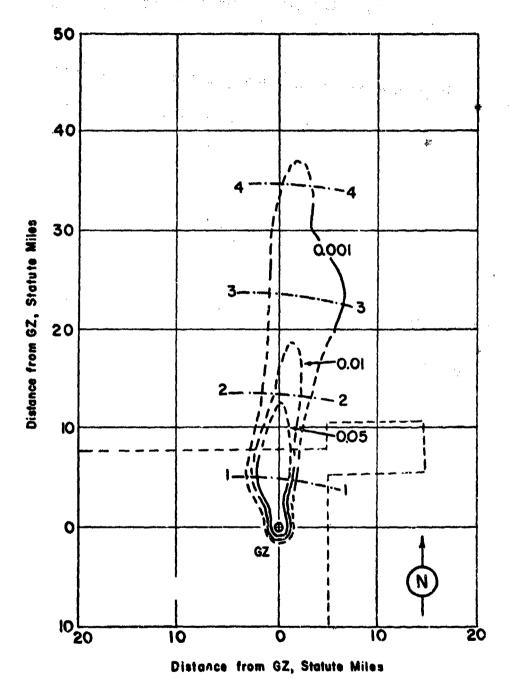


Figure 276. Operation HARDTACK II - Vesta.
Off-site dose rate contours in r/hr at H+l hour.

Altitude	H-hou	H-hour		
(MSL)	Dir	Speed		
feet	degrees	mph		
Surface	160	07		
5,000	180	12		
6,000	190	12 14		
7,000	190	14		
8,000	200	12		
9,000	210	10		
10,000	210	08		
11,000	200	09		
12,000	180	07		

NOTE: Wind data was obtained from the Yucca weather station.

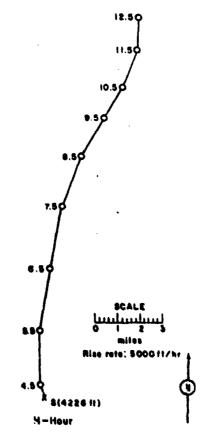


Figure 277. Hodograph for Operation HARDTACK II -

Veste

#### Rio Arriba

PST CMT

DATE: 18 Oct 1958 18 Oct 1958

TIME: 0625 1425

TOTAL YIELD: 90 tons

FIREBALL DATA:

Time to 1st minimum: NM Time to 2nd maximum: NM Radius at 2nd maximum: NM

CRATER DATA: Not available

Sponsor: LASL

SITE: NTS - Area 3s 37° 02' 28" N 116° 01' 33" W Site elevation: 4,010 ft

HEIGHT OF BURST: 72.5 ft

TYPE OF BURST AND PLACEMENT:
Tower burst over Nevada soil

CLOUD TOP HEIGHT: 13,500 ft MSL CLOUD BOTTOM HEIGHT: 11,000 ft MSL

# REMARKS:

The on-site fallout documentation was performed by the Fadiological Safety Division of the Reynolds Electrical and Engineering Company for purposes of personnel safety. Readings were taken with AN/PDR-39 or Tracerlab SU-10 instruments at H+1 hour, H+6 hours, D+1 day, D+2 days and D+3 days along eight radial roads. The fallout was well documented and the pattern presented is considered to be reliable. The t<sup>-1.2</sup> decay approximation was used to extrapolate the dose-rate readings to H+1 hour.

The off-site fallout documentation was performed with Beckman MX-5 and AN/PDR-39 instruments by the U. S. Public Health Service for purposes of public safety. Readings were taken at about 10-mile intervals except in populated places or when the dose-rate varied considerably with distance. The downwind extent of the 0.002 and 0.001 r/hr isodose rate lines is uncertain. The rest of the pattern was well documented and is reliable. The t<sup>-1.2</sup> decay approximation was used to extrapolate the dose-rate readings to 3+1 hour.

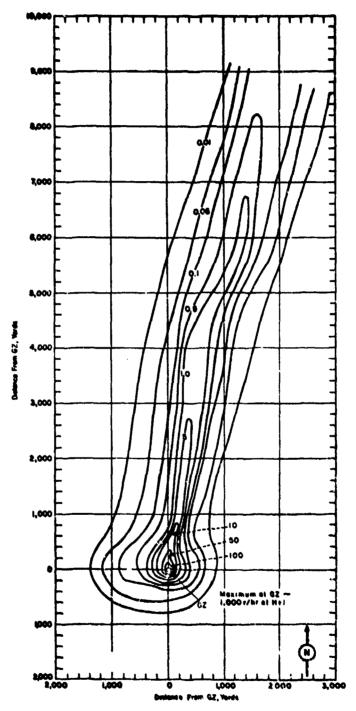


Figure 278. Operation HARDTACK II - Rio Arriba.
On-site dose rate contours in r/br at H+1 hour.

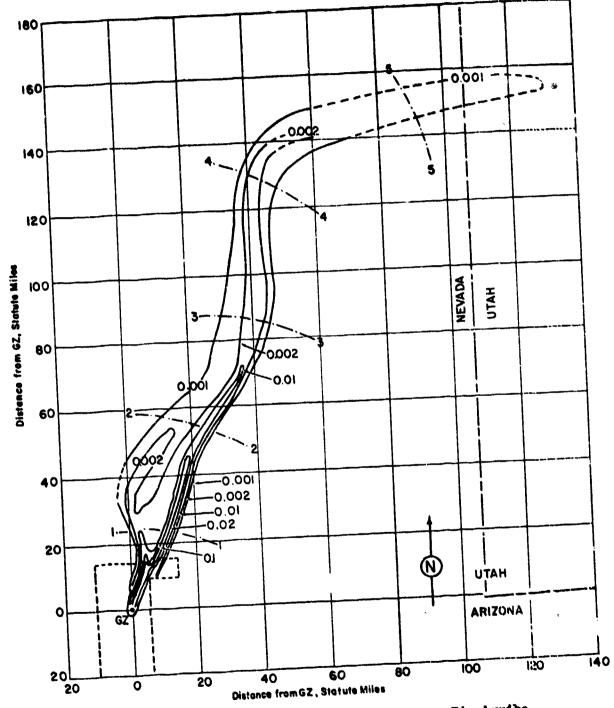


Figure 279. Operation HARDMACK II - Rio Arriba.
Off-site dose rate contours in r/hr at H+1 hour.

Altitude	H-hour		
(MSL)	Dir	Speed	
feet	degrees	mph	
Surface	170	02	
5,000	180	09	
6,000	200	2 <b>ļ</b> t	
7,000	200	35	
8,000	200	37	
9,000	200	33	
10,000	210	35	
11,000	210	38	
12,000	210	40	
13,000	<b>510</b>	40	
14,000	210	38	
15,000	210	36	

# NOTES:

- Wind data was obtained from the Yucca weather station.
   The surface air pressure was 12.75 psi, the temperature 9.3°C, the dew point -10.3°C, and the relative humidity 24%.



Figure 280 . Hodograph for Operation HARDTACK II -

Rio Arriba.

# OPERATION HARDTACK II - San Juan Safety Experiment

<u>PST</u> CMT <u>DATE:</u> 20 Oct 1958 20 Oct 1958 <u>TIME:</u> 0630 1430 Sponsor: LASL

SITE: NTS - Area 3p 37° 03' 0" N 116° 01' 56" W Site elevation: 4,033 ft

HEIGHT OF BURST: -234 ft

TYPE OF BURST AND PLACEMENT:
Subsurface burst - Well in
Nevada soil

CLOUD TOP HEIGHT: NM CLOUD BOTTOM HEIGHT: NM

#### REMARKS:

"There was essentially no nuclear yield from the San Juan explosion, and no visible venting occurred. There was, however, some alpha contamination detected in the jumes are vicinity of the well in which this device was detonated"

#### Socorro

PST CMT

DATE: 22 Oct 1958 22 Oct 1958

TIME: 0530 1330

TOTAL YIELD: 6 kt

Sponsor: LASL

SITE: NTS - Area 7b 37° 05' 12" N 116° 01' 25" W Site elevation: 4,186 ft

HEIGHT OF BURST: 1,450 ft

TYPE OF BURST AND PLACEMENT:
Air burst from balloon over
Nevada soil

CLOUD TOP HMIGHT: 26,000 ft MSL CLOUD BOTTOM HEIGHT: 20,000 ft MSL

#### FIREBALL DATA:

Time to 1st minimum: NM
Time to 2nd maximum: NM
Radius at 2nd maximum: NM

### REMARKS:

The contamination was due primarily to induced activity. The on-site measurements were performed by the Radiological Safety Division of the Reynolds Electrical and Engineering Company for purposes of personnel safety. Readings were taken with AN/PDR-39 or Tracerlab SU-10 instruments at H+1 hour and D+3 days. The sodium-24 decay rate was used to extrapolate the dose-rate readings to H+1 hour. The pattern was relatively well documented and is considered to be fairly reliable. The decay rate used is not strictly applicable although it closely approximates the observed decay.

Socorro was the first of three nuclear detonations to occur on the same day. The trajectory analysis for these three events indicated that all the clouds should have been transported in the same general direction; therefore, no off-site pattern is presented for this shot.

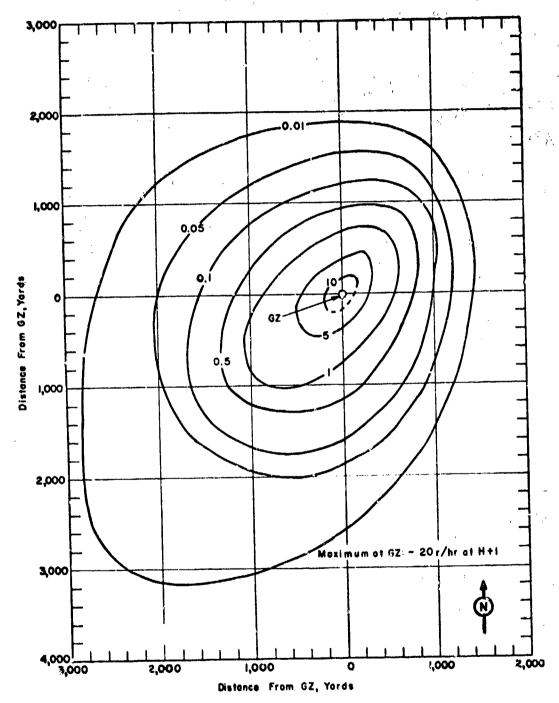


Figure 281. Operation HARDTACK II - Socorro.
On-site dose rate contours in r/hr at H+1 hour.

	Altitude	H-hou	17	H+31 hor	urs	H+10 ho	irs
	(MSL)	Dir	Speed	Dir	Speed	Dir	Speed
<del></del>	feet	degrees	mph	degrees	mph	degrees	mph
	Surface	320	03	090	02	140	05
	5,000	110	06	060	09	170	- 08
	6,000	110	07				
	7,000	130	09			,	•••
	8,000	150	10				·
	9,000	160	10				. ==
	10,000	180	15	210	13	220	19
	11,000	3.90	13				<b>*</b>
	12,000	230	15	230	12	220	26
,	13,000	260	18	-			
	14,000	240	07		`		
	15,000	230	97				
	16,000	550	06				
	17,000	200	09			<b>6</b> -0 w	
	18,000	210	16			~	
	19,000	210	15	<b>4</b> 44 <b>4</b>			
	20,000	220	18				
	21,000	220	22				
	22,000	220	18			Tim 100 107	
	23,000	550	19				
	24,000	210	23		~~		
	25,000	550	25		•-		
	26,000	220	25	en . Th. esp. "		₹7 <b>45 45</b>	÷ •
	27,000	220	25				

# NOTES:

Wind data was obtained from the Yucca weather station. The surface air pressure was 12.68 psi, the temperature 4.7°C, the dew point -14.7°C, and the relative humidity 13%.

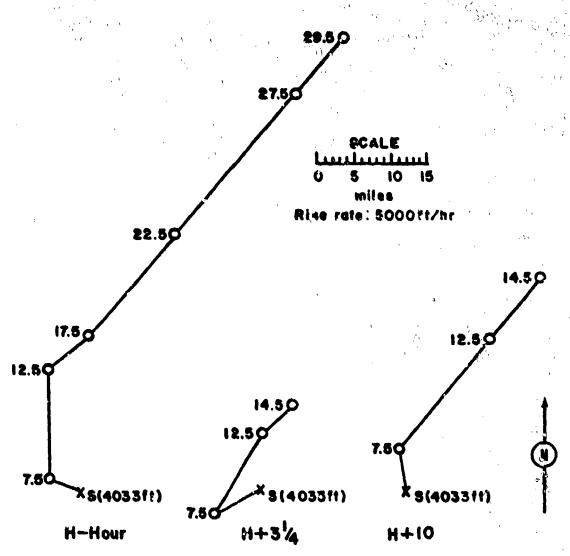


Figure 282. Hodographs for Operation HARDTACK II -

Secorre

Wrangell

PST

22 Oct 1958 22 Oct 1958

TIME: 0850

1650

TOTAL YIELD: 115 tons

Sponsor: UCRL

SITE: MIS - Area Fa

36° 47'

1150 551 Site elevation: 3,077 ft

HEIGHT OF BURST: 1,500 ft

FIREBALL DATA:

Time to 1st minimum: Time to 2nd maximum: NM Radius at 2nd maximum:

CRATER DATA: No crater

TYPE OF EURST AND PLACEMENT:

Air burst from balloon over

Nevada soil

CLOUD TOP HEIGHT: 10,000 ft MSL CLOUD BOTTOM HEIGHT: 7.000 ft MSL

#### REMARKS:

The contamination was due primarily to induced activity. The on-site measurements were performed by the Radiological Safety Division of Reynolds Electrical and Engineering Company for purposes of personnel safety. Readings were taken with AN/PDR-39 or Tracerlab SU-10 instruments. The sodium-24 decay rate was used to extrapolate the dose-rate readings to H+1 hour. This decay rate is not strictly applicable although it closely approximates the observed decay. Because of the lack of data in some areas around ground zero there is not a high degree of confidence in the analysis of the on-site pattern.

The off-site fallout documentation was performed with Beckman MX-5 and AN/PDR-39 instruments by the U. S. Public Health Service for purposes of public safety. Three nuclear detonations occurred on the same day. Since the trajectories for these three events were in the same general direction, there was some difficulty in determining from which shots the observed fallout originated; therefore, no offsite pattern is presented for this shot.

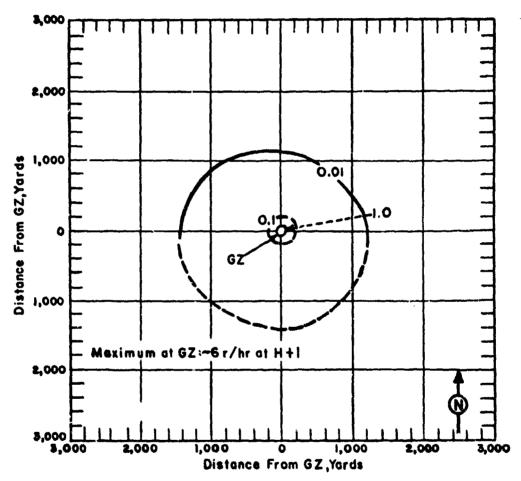
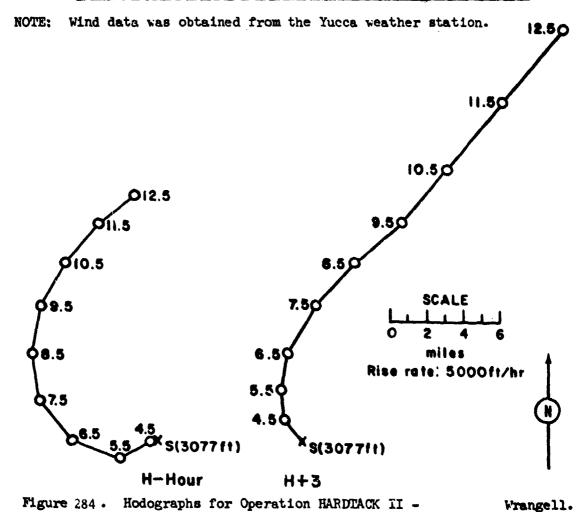


Figure 283. Operation HARDTACK II - Wrangell. On-site dose rate contours in r/hr at H+l hour.

Altitude	H-ho	ır	H+3 h	OUTS
(MSL)	Dir	Speed	Dir	Speed
feet	degrees	mph	degrees	mph
Surface	090	02	140	05
5,000	060	09	170	80
6,000	110	14	190	10
7,000	140	14	210	14
8,000	170	13	220	16
9,000	190	13	230	17
10,000	210	13	220	19
11,000	220	14	220	23
12,000_	230	12	220	26



455

# OPERATION HARDTACK II - Oberon Safety Experiment

PST CAT PST 22 Oct 1958 71ME: 1230 2030

Sponsor: UCRL

SITE: NTS - Area &a 37° 10' 42" N 116° 04' 03" W Site clevation: 4,446 ft

HEIGHT OF BURST: 25 ft

TYPE OF HURST AND PLACEMENT:
Tower burst over Nevada soil

CLOUD TOP HEIGHT: Very low

# REMARKS:

No fallout - some alpha contamination.

#### Rushmore

PST GMT

DATE: 22 Oct 1958 22 Oct 1958

TIME: 1540 2340

TOTAL YTELD: 188 tons

FIREBALL DATA:

Time to 1st minimum: 2 msec Time to 2nd maximum: 21 msec Radius at 2nd maximum: NM

CRATER DATA: No crater

Sponsor: UCRL

SITE: MNS - Area 9a 37° 08' 05" N 116° 02' 27" W Site elevation: 4,244 ft

HEIGHT OF BURST: 500 ft

TYPE OF DURST AND PLACEMENT:
Air burst from balloon over
Nevada soil

CLOUD TOP HEIGHT: 1,500 ft MSL CLOUD BOTTOM HEIGHT: Not available

#### REMARKS:

The contamination is due primarily to induced activity. The on-site measurements were performed by the Radiological Safety Division of Reynolds Electrical and Engineering Company for purposes of personnel safety. Readings were taken with AN/PDR or Tracerlab SU-10 instruments at H+2 hour, D+1 day and D+2 days. The sodium-24 decay rate was used to extrapolate the dose-rate readings to H+1 hour. This decay rate is not strictly applicable although it closely approximates the observed decay. Because of the lack of data in some areas around ground zero, there is not a high degree of confidence in the pattern.

Three nuclear detonations occurred on the same day. Since the trajectories for these three events were in the same general direction, there was some difficulty in determining from which shots the observed fallout originated; therefore no off-site pattern is presented for this shot.

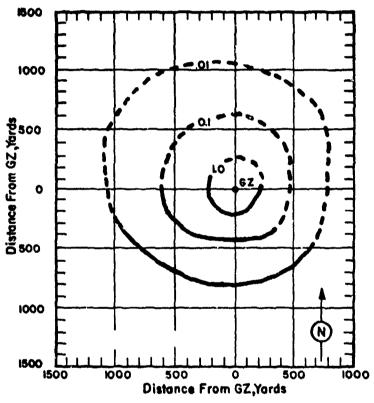


Figure 285. Operation HARDTACK II - Rushmore.
On-site dose rate contours in r/hr at H+1 hour.

Altitude	H-hour			
(MSL)	Dir	Speed		
feet	degrees	mph		
Surface	140	05		
5,000	170	80		
6,000	190	10		
7,000	210	14		
8,000	220	16		
9,000	230	17		
10,000	220	19		
11,000	220	23		
12,000	220	26		

- Wind data was obtained from the Yucca weather station.
- Tropopause height was 42,000 ft MSL.
   The surface air pressure was 12.66 psi, the temperature 17.8°C, and the relative humidity 12%.

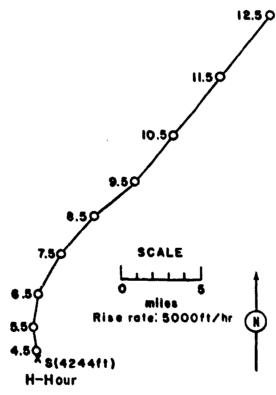


Figure 286. Hodograph for Operation HARDTACK II -

Rushmore.

# OPERATION HARDTACK II - Catron Safety Experiment

<u>PST</u> <u>CMT</u> <u>DATE</u>: 24 Oct 1958 24 Oct 1958

TIME: 0700 1500

TOTAL YIELD: 21 tons

FIREBALL DATA:

Time to 1st minimum: NM
Time to 2nd maximum: NM
Radius at 2nd maximum: NM

Sponsor: LASL

SITE: NTS - Area 3t 37° 02' 35" N 116° 01' 37" W

HEIGHT OF BURST: 72.5 ft

TYPE OF BURST AND PLACEMENT:
Tower burst over Nevada soil

CLOUD TOP HEIGHT: 8,500 ft MSL CLOUD BOTTOM HEIGHT: 5,000 ft MSL

#### REMARKS:

The on-site fallout documentation was performed by the Radiological Sofety Division of the Reynolds Electrical and Engineering Company for purposes of personnel safety. Readings were taken with AN/PDR-39 or Tracerlab SU-10 instruments at  $H^{+\frac{1}{2}}$  hour,  $H^{+}$ 7 hours,  $D^{+}$ 1 day and  $D^{+}$ 2 days. The  $t^{-1\cdot 3}$  decay approximation was used to extrapolate the dose-rate readings to  $H^{+}$ 1 hour. "The on-site fallout from Catron was well documented and the pattern presented is considered to be reliable.

A special on-site survey was very helpful in distinguishing between the Catron fallout and the Juno fallout.

The off-site fallout documentation was performed with Beckman MX-5 and AN/PDR-39 instruments by the U. S. Public Health Service for purposes of public safety. The  $t^{-1}$  decay approximation was used to extrapolate the dose-rate readings to H+1 hour. There is a great deal of uncertainty in the off-site fallout pattern because of the lack of data.

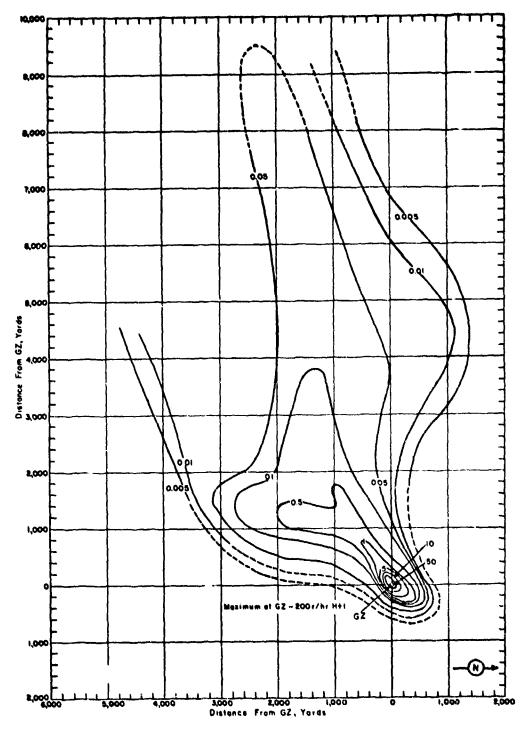


Figure 287. Operation HARDTACK II - Catron.
On-site dose rate contours in r/hr at H+l hour.

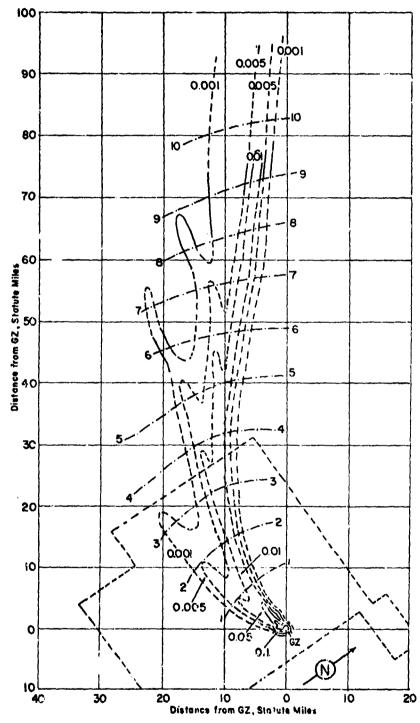


Figure 288. Operation HARDTACK II - Catron.
Off-site dose rate contours in r/hr at H+l hour.

Altitude	H-ho	ur	H+l hours	
(MSL)	Dir	Speed	Dir	Speed
feet	degrees	mph	degrees	mph
Surface	030	02	360	05
5,000	040	09	030	07
6,000	060	09	070	08
7,000	090	09	100	10
8,000	110	12	110	14
9,000	120	16	120	16
10,000	120	18	120	17

NOTE: Wind data was obtained from the Yucca weather station.

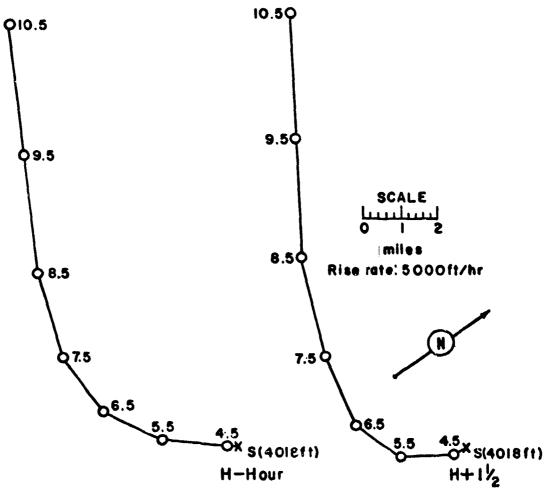


Figure 289. Hodographs for Operation HARDTACK II -

Catron.

# OPERATION HARDTACK II - Juno Safety Experiment

PST CMT
24 Oct 1958 24 Oct 1958

TIME: 0801 1601

TOTAL YIELD: 1.7 tors

FIREBALL DATA:

Time to 1st minimum: NM
Time to 2nd maximum: NM
Radius at 2nd maximum: NM

CRATER DATA: Not available

Sponsor: UCRL

SITE: NTS - Area 9f

37° 07' 24" N 116° 02' 16" W

Site elevation: 4,210 ft

HEIGHT OF BURST: Surface

TYPE OF BURST AND PLACEMENT:

Surface burst in wooden building with 20 ft of gravel over the

building

CLOUD TOP HEIGHT: 5,500 ft MSL

CLOUD BOTTOM HEIGHT: NM

# REMARKS:

The on-site fallout documentation was performed by the Radiological Safety Division of the Reynolds Electrical and Engineering Company for purposes of personnel safety. Readings were taken with AN/PDR-39 or Tracerlab SU-10 instruments at H+7 hours, D+1 day and D+2 days. The t-1.2 decay approximation was used to extrapolate the dose-rate readings to H+1 hour. The onsite inflout was well documented and the pattern presented is considered to be reliable.

"No significant off-site radioactivity was reported that could be attributed to the Juno event".

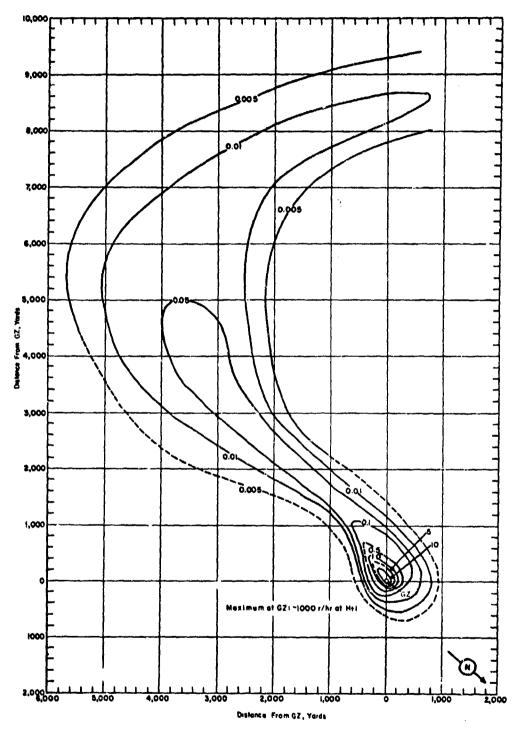


Figure 290. Operation HARDIACK II - Juno. On-site dose rate contours in r/hr at H+1 hour.

TABLE 94 NEVADA WIND DATA FOR OPERATION HARDTACK II - JUNO

Altitude	H+를 hour		
(MSL)	Dir	Speed	
feet	degrees	mph	
Surface	360	05	
5,000	030	07	
6,000	070	08	
7,000	100	10	
8,000	110	14	
9,000	120	16	
10,000	120	17	

NOTE: Wind data was obtained from the Yucca weather station.

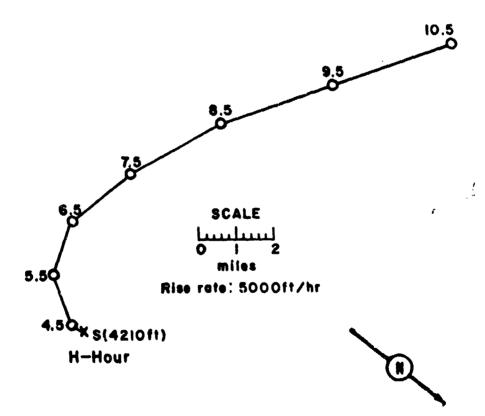


Figure 291. Hodograph for Operation HARDTACK II -

Juno.

# OPERATION HARDTACK II - Ceres Safety Experiment

PST CMT

DATE: 25 Oct 1958 26 Oct 1958

TIME: 2000 0400

TOTAL YIELD: 0.7 tons

FIREBALL DATA:

Time to 1st minimum: NM
Time to 2nd maximum: NM
Radius at 2nd maximum: NM

Sponsor: UCRL

SITE: NTS - Area 8b 37° 10' 53" N 116° 04' 07" W Site elevation: 4,428 ft

HEIGHT OF BURST: 25 ft

TYPE OF BURST AND PLACEMENT:
Tower burst over Nevada soil

CLOUD TOP HEIGHT: 6,000 ft MSL CLOUD BOTTOM HEIGHT: NM

### REMARKS:

The on-site fallout documentation was performed by the Radiological Safety Division of the Reynolds Electrical and Engineering Company for purposes of personnel safety. Readings were taken with AN/PDR-39 or Tracerlab SU-10 instruments at  $H^{+1}_{2}$  hour and  $H^{+1}_{3}$  hours. The  $t^{-1\cdot2}_{3}$  decay approximation was used to extrapolate the dose-rate readings to  $H^{+1}_{3}$  hour. The pattern is not reliable. A possible explanation of the discrepancy between the observed radiation field and the wind field is that, since the windswere rather light, the observed winds at the Yucca Lake Weather Station were probably not representative.

Off-site measurements detected no radioactivity above background.

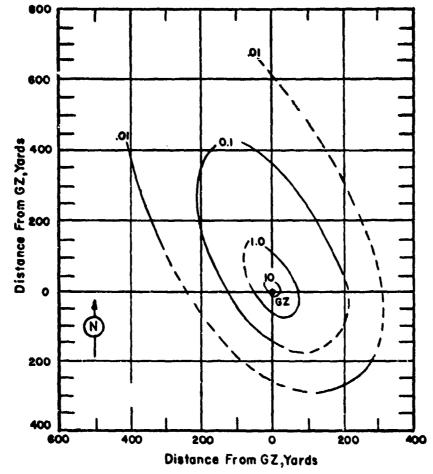


Figure 292. Operation HARDTACK II - Ceres.
On-site dose rate contours in r/hr at H+l hour.

Altitude	H-h	H-hour		H+1 hour		
(MSL)	Dir	Speed	Dir	Speed		
feet	degrees	mph	degrees	mph		
Surface	330	2	310	6		
5,000	550	5	-	•		
6,000	200	6	***	-		
7,000	160	7		-		
8,000	140	7		-		

NOTE: Wind data was obtained from the Yucca weather station.

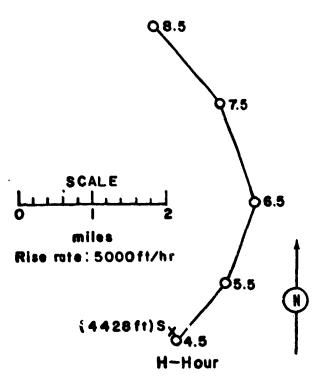


Figure 293. Hodograph for Operation HARDTACK II -

Ceres.

#### OPERATION HARDTACK II - Sanford

PST CMT 26 Oct 1958 26 Oct 1958 0220 1020

TOTAL YIELD: 4.9 kt

FIREBALL DATA:

Time to 1st minimum: NM
Time to 2nd maximum: NM
Radius at 2nd maximum: NM

CRATER DATA: No crater

Sponsor: UCRL

SITE: NTS - Area Fa

36° 47' 53" N 115° 55' 44" W

fite elevation: 3,077 ft

HEIGHT OF BURST: 1,500 ft

TYPE OF BURST AND PLACEMENT:

Air burst from balloon over

Nevada soil

CLOUD TOP HEIGHT: 26,000 ft MSL CLOUD BOTTOM HEIGHT: 12,500 ft MSL

## REMARKS:

The contamination was due primarily to induced activity. The on-site measurements were performed by the Radiological Safety Division of the Reynolds Electrical and Engineering Company for purposes of personnel safety. Readings were taken with AN/PDR-39 or Tracerlab SU-10 instruments at  $H+\frac{1}{2}$  hour, H+6 hours, D+1 day and D+2 days. The sodium-24 decay rate was used to extrapolate the dose-rate readings to H+1 hour. This decay rate is not strictly applicable although it closely approximates the observed decay. "Because of the lack of data in most of the areas around ground zero, there is not a very high degree of confidence in the analysis of the on-site pattern".

Very little radioactivity above background was detected off-site.

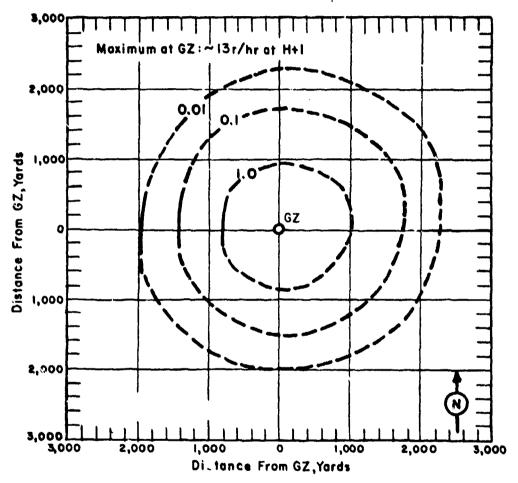


Figure 294. Operation HARDTACK II - Sanford On-site dose rate contours in r/hr at H+l hour.

TABLE 96 NEVADA WIND DATA FOR OPERATION HARDTACK II- SANFORD

Altitude	H-hou	r	H+5 *	hours
(MSL)	Dir	Speed	Dir	Speed
feet	degrees	mph	degrees	mph
Surface	140	01	Calm	Calm
5,000	010	03	010	02
6,000	110	02		~~
7,000	190	02	***	~-
8,000	180	80		~-
9,000	150	09		~-
10,000	120	80	210	07
11,000	120	10		-
12,000	190	07		
13,000	250	12		
14,000	250	21		
15,000	250	21	270	12
16,000	250	5,4		
17,000	240	23		
18,000	240	29		
19,000	230	32		
20,000	230	26	240	22
21,000	230	39		
22,000	230	46		
23,000	230	45		
24,000	220	41		
25,000	220	35		
26,000	210	33		
27,000	210	34		

NOTE: Wind data was obtained from the Yucca weather station.

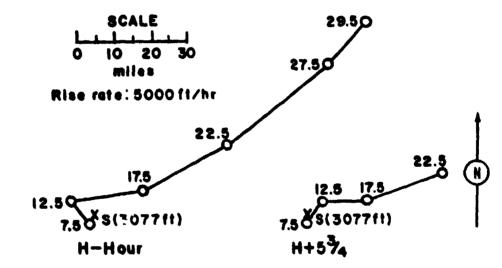


Figure 295. Hodographs for Operation HARDTACK II -

Sanford.

#### OPERATION HARDTACK II -

## DeBaca

PST CMT

DATE: 26 Oct 1958 26 Oct 1958

TIME: 0800 1600

TOTAL YIELD: 2.2 kt

FIREHALL DATA:

Time to 1st minimum: NM
Time to 2nd maximum: NM
Radius at 2nd maximum: NM

CRATER DATA: No crater

Sponsor: LASL

SITE: NTS - Area 7b 37° 05' 12" N 116° 01' 25" W Site elevation: 4,186 ft

HEIGHT OF BURST: 1,500 ft

TYPE OF BURST AND PLACEMENT:

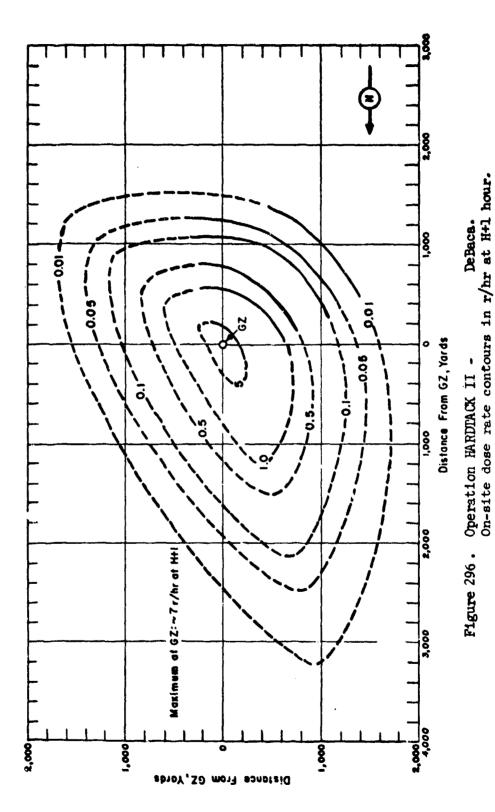
Air burst from balloon over
Nevada soil

CLOUD TOP HEIGHT: 17,500 ft MSL CLOUD BOTTOM HEIGHT: 10,000 ft MSL

## REMARKS:

The contamination was due primarily to induced activity. The on-site measurements were performed by the Radiological Safety Division of the Reynolds Electrical and Engineering Company for purposes of personnel safety. Readings were taken with AN/PDR-39 or Tracerlab SU-10 instruments at H+½ hour, H+6 hours, D+1 day and D+2 days. The sodium-24 decay rate was used to extrapolate the dose-rate readings to H+1 hour. This decay rate is not strictly applicable although it closely approximates the observed decay. Because of the lack of data in most areas around ground zero the pattern is unreliable.

Very little radioactivity above background was detected off-site.



Altitude	H-hour		Altitude	H-hou	r
(MSL)	Dir	Speed	(MSL)	Dir	Speed
feet	degrees	mph	feet	degrees	mph
Surface	Calm	Calm	12,000	260	14
5,000	010	02	13,000	270	24
6,000	030	02	14,000	280	13
7,000	020	01	15,000	270	12
8,000	070	02	16,000	260	13
9,000	130	03	17,000	500	17
10,000	210	07	18,000	230	21.
11,000	250	12	19,000	240	22
•	-		20,000	5J†O	22

# NOTES:

- 1. Wind data was obtained from the Yucca weather station.
- 2. The surface air pressure was 12.75 psi, the temperature 8.3°C, the dew point 5.1°C, and the relative humidity 80%.

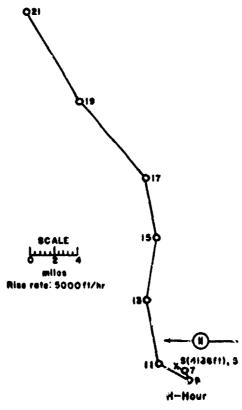


Figure 297. Hodograph for Operation HARDTACK II -

De Baca.

### OPERATION HARDTACK II -

Chaves

PST GMT 27 Oct 1958 27 Oct 1958

TIME: 0630 1430

TOTAL YIELD: 0.6 tons

FIREBALL DATA:

Time to 1st minimum: NM
Time to 2nd maximum: NM
Radius at 2nd maximum: NM

Sponsor: LASL

SITE: NTS - Area 3u 37° 02' 41" N 116° 01' 47" W

Site elevation: 4,025 ft

HEIGHT OF BURST: 52.5 ft

TYPE OF BURST AND PLACEMENT:
Tower burst over Nevada soil

CLOUD TOP HEIGHT: 6,500 ft MSL CLOUD BOTTOM HEIGHT: NM

# REMARKS:

The on-site fallout documentation was performed by the Radiological Safety Division of the Reynolds Electrical and Engineering Company for purposes of personnel safety. Readings were taken with AN/PDR-39 or Tracerlab SU-10 instruments at H+½ hours, H+8 hours, and D+1 day. The t-1.2 decay approximation was used to H+1 hour. "The downwind extent of the activity is only a rough approximation because of the limited number of measurements. The rest of the pattern was relatively well documented and should be fairly reliable"

No pattern is presented of the off-site fallout because of the limited area that was monitored and the relatively low reading obtained.

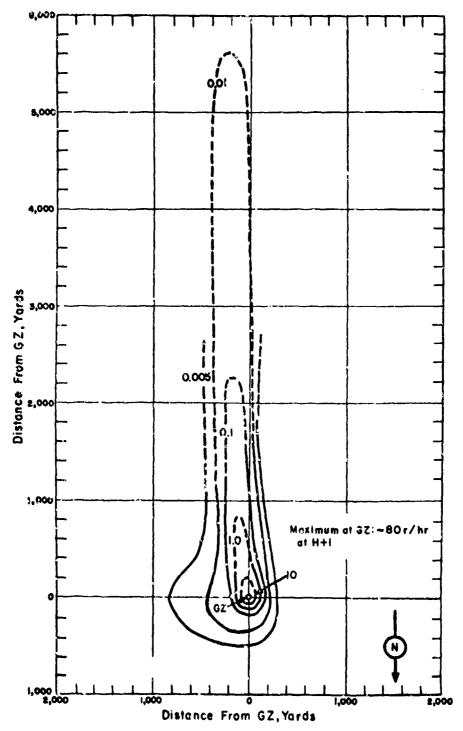


Figure 298. Operation HARDNACK II - Chaves.
On-site dose rate contours in r/hr at H+1 hour.

Altitude	H-hour			
(MSL)	Dir	Speed		
feet	degrees	mph		
Surface	350	09		
5,000	360	16		
6,000	010	18		
7,000	030	٦8 -		
8,000	030	15		

NOTE: Wind data was obtained from the Yucca weather station.

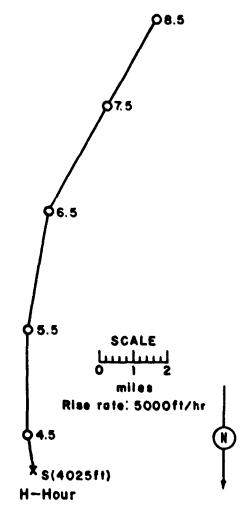


Figure 299. Hodograph for Operation HARDTACK II -

Chaves.

OPERATION HARDIACK II -

Evans

PST CMT 28 Oct 1958 29 Oct 1958

DATE: 28 Oct 1958 29 C

.958

Sponsor: UCRL

SITE: NTS - Area 12b.04 37° 11' 41" N

116° 12' 17" W

Site elevation: 6,650 ft

TOTAL YIELD: 55 tons

HEIGHT OF BURST: Slant distance 848 ft. Vertical depth 852 ft

FIREBALL DATA:

Time to 1st minimum: NM
Time to 2nd maximum: NM
Radius at 2nd maximum: NM

TYPE OF BURST AND PLACEMENT:
Subsurface burst - Tunnel in
Nevada soil

CRATER DATA: Not available

# REMARKS:

A small amount of smoke was seen to vent from the portal. This vented material produced very low levels of radiation at a few isolated points.

TABLE 99 NEVADA WIND DATA FOR OPERATION HARDTACK II -

**EVANS** 

		SURFAC	E WINDS		
TIME	9 foot Mesa Slope Tower		100 foot Mesa Mountain Tower		
	(Elev. 6,72		(Elev. 7,46		
	Dir	Speed	Dir	Speed	
	degrees	mph	degrees	mph	
H-hour	290	8	360	Missin	
H+1 hour	280	8	360	Missin	
H+2 hours	260	5	360	Missin	

NOTE: Wind data was obtained from the Yucca weather station.

OPERATION HARDTACK II -

Humboldt

PST GMT
29 Oct 1958 29 Oct 1958

IME: 0045 1445

TOTAL YIELD: 7.8 tons

FIREBALL DATA:

Time to 1st minimum: NM
Time to 2nd maximum: NM
Radius at 2nd maximum: NM

CRATER DATA: Not available

Sponsor: UCRL - DOD

SITE: NTS - Area 3v

37° 02' 52" N 116° 01' 29" W

Site elevation: 4,029 ft

HEIGHT OF BURST: 25 ft

TYPE OF BURST AND PLACEMENT:
Tower burst over Nevada soil

CLOUD TOP HEIGHT: 7,500 ft MSL CLOUD BOTTOM HEIGHT: 6,000 ft MSL

## REMARKS:

The on-site fallout documentation was severely limited by changes in the GZ location and the operational firing schedule. Readings for the very close-in pattern were taken by the Chemical Corps Radiological Safety Support Unit at points along the north, east, south, and west radial lines at times between 0.1 and 6.7 hours. Experimental doserate decay curves were used to extrapolate the readings to H+l hour. Readings for the on-site fallout pattern were taken at  $H^{\frac{1}{2}}$  hour, H+5 hours, H+27 hours and D+2 days. The  $t^{-1\cdot 2}$  decay approximation was used to extrapolate the dose-rate readings to H+l hour. "The on-site fallout from Humboldt was well documented and the pattern is considered reliable"

The off-site fallout documentation was performed with Beckman MK-5 and AN/PDR-39 instruments by the U.S. Public Health Service for purposes of public safety. The t<sup>-1</sup>·<sup>2</sup> decay approximation was used to extrapolate the dose-rate readings to H+1 hour. "Although there is some uncertainty in the downwind extent of some of the isolines, there is fair confidence in the width of the pattern and in the orientation of the fallout, which is consistent with the wind analysis".

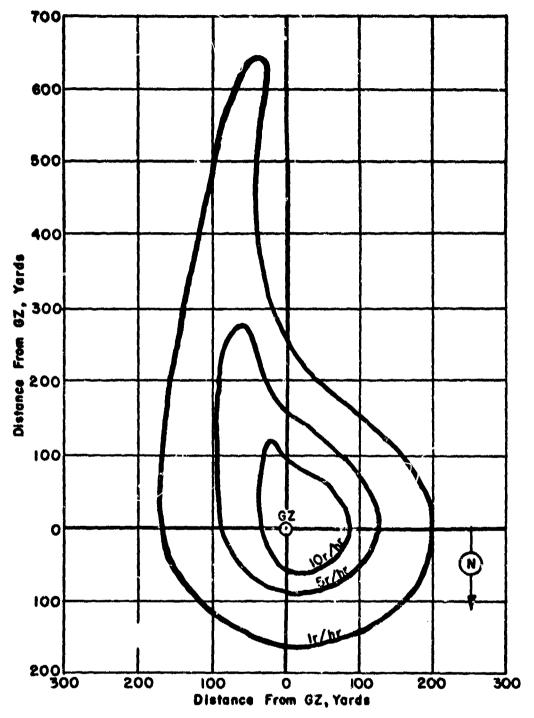


Figure 300. Operation HARDTACK II - Humboldt. Very close-in dose rate contours in r/nr at Hol hour.

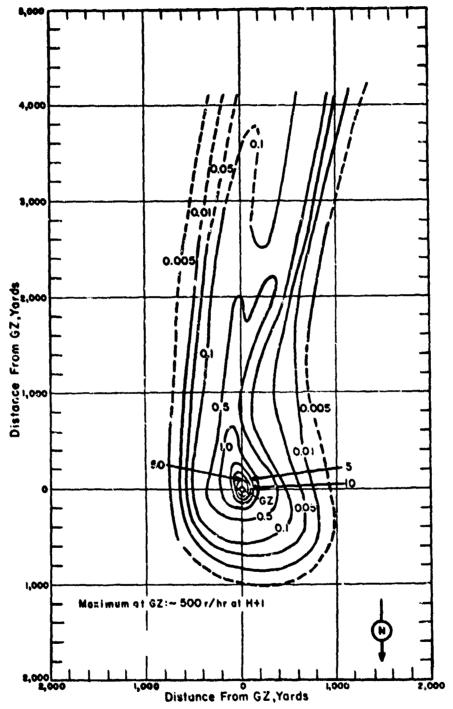


Figure 301. Operation HARDTACK II. - Humboldt. On-site dose rate contours in r/hr at H+1 hour.

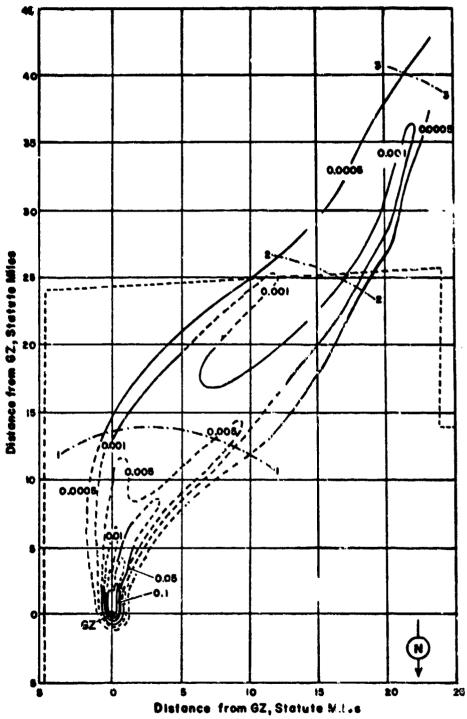


Figure 302. Operation HARDTACK II - Humboldt.
Off-site dose rate contours in r/hr at H+l hour.

Altitude	H-hou	r
(MSL)	Dir	Speed
feet	degrees	mbp
Surface	340	07
5,000	010	29
5,000 6,000	020	30
7,000	030	37
8,000	030	33
9,000	030	22
10,000	040	16

# NOTES:

- 1. Wind data was obtained from the fucca weather station.
- 2. The surface air pressure was 12.84 psi, the temperature 7.4°C, the dew point -3.2°C, and the relative humidity 46%.

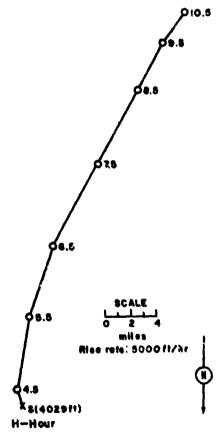


Figure 303. Hodograph for Operation HARDTACK II -

Humboldt

# OPERATION HARDIACK II -

### Santa Fe

PST CMT

DATE: 29 Oct 1958 30 Oct 1958

TIME: 1900 0300

Sponsor: IASL

\_\_\_\_\_\_

SITE: NTS - Area 7b 37° 05' 12" N 116° 01' 25" W Site elevation: 4,186 ft

TOTAL YIELD: 1.3 kt

HEIGHT OF BURST: 1,500 ft

FIREBALL DATA:

Time to 1st minimum: NM
Time to 2nd maximum: NM

Time to 2nd maximum: NM Radius at 2nd maximum: NM

TYPE OF BURST AND PLACEMENT:
Air burst from balloon over
Nevada soil

CRATER DATA: No crater

CLOUD TOP HEIGHT: 18,000 ft MSL CLOUD BOTTOM HEIGHT: 13,000 ft MSL

#### REMARKS:

The contamination was due primarily to induced activity. The on-site measurements were performed by the Radiological Safety Division of the Reynolds Electrical and Engineering Company for purposes of personnel safety. Readings were taken with AN/PDR-39 or Tracerlab SU-10 instruments at H+1 hour, H+16 hours, D+2 days and D+3 days. The sodium-24 decay rate was used to extrapolate the dose-rate readings to H+1 hour. This decay rate is not strictly applicable although it closely approximates the observed decay.

The off-site fallout was very light and no pattern is presented.

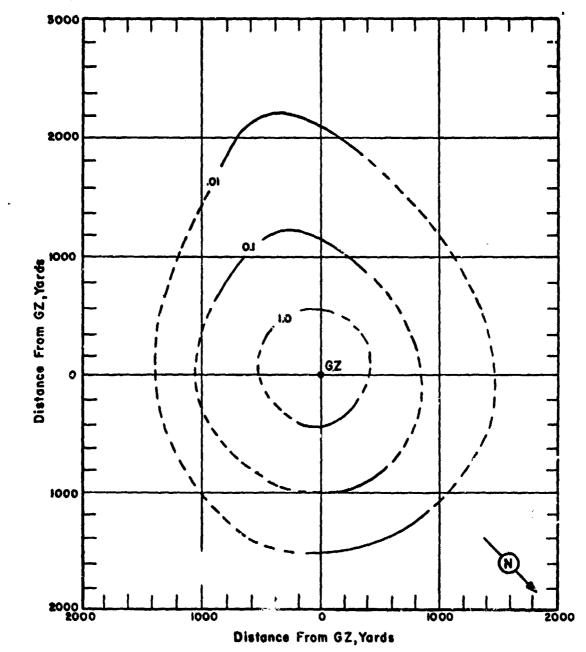


Figure 304. Operation HARDTACK II - Santa Fe. On-site dose rate contours in r/hr at H+l hour.

Altitude	H-hou	r	Altitude	H-hau	r
(MSL)	Dir	Speed	(MSL)	Dir	Speed
feet	degrees	mph	feet	degrees	mby
Surface	350	04	13,000	030	36
5,000	018	13	14,000	040	40
6,000	040	17	15,000	040	43
7,000	040	20	16,000	040	43
8,000	040	22	17,000	030	44
9,000	040	25	18,000	030	44
10,000	030	28	19,000	028	46
11,000	020	28	20,000	020	51
12,000	030	31	•		

## NOTES:

- 1. Wind data was obtained from the Yucca weather station.
- 2. Tropopause height was 39,000 ft MSL.
- 3. The surface air pressure was 12.70 psi, the temperature 12.1°C, the dew point -7.4°C, and the relative humidity 25%.

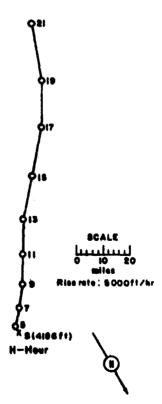


Figure 305. Hodograph for Operation HARDTACK II -

Santa Fe.

# OPERATION HARDTACK II - Ganymede Safety Experiment

PST CMT

DATE: 30 Oct 1958 30 Oct 1958

TIME: 0300 1100

Sponsor: UCRL

SITE: NTS - Area 9g 37° 07' 27" N Site elevation: 4,193 ft

HEIGHT OF BURST: Surface

TYPE OF BURST AND PLACEMENT:
Surface burst in wooden
building with 20 ft of
gravel over the building

CLOUD TOP HEIGHT: NM CLOUD BOTTOM HEIGHT: NM

# REMARKS:

There was no nuclear yield for this event. There was some alpha contamination in the immediate vicinity of ground zero.

#### OPERATION HARDTACK II -

#### Blanca

 PST
 CMT

 DATE:
 30 Oct 1958
 30 Oct 1958

 TIME:
 0700
 1500

TOTAL YIELD: 19 kt

FIREBALL DATA:

Time to 1st minimum: NM
Time to 2nd maximum: NM
Radius at 2nd maximum: NM

CRATER DATA: Not available

Sponsor: UCRL

SITE: NTS - Area 12e.05 37° 11' 09" N 116° 12' 07" W Site elevation: 7,120 ft

HEIGHT OF BURST: -835 ft
Slant Distance. Vertical
depth 987 ft.

TYPE OF BURST AND PLACEMENT: Subsurface burst - Tunnel in Nevada soil

CLOUD TOP HEIGHT: 7,700 ft

### REMARKS:

The on-site fallout documentation was performed by the Radiological Safety Livision of the Reynolds Electrical and Engineering Company for purposes of personnel safety. Readings were taken with AN/PDR-39 or Tracerlab SU-10 instruments at H+ hour, H+6 hours, D+1 day and D+2 days. Due to inadequate mapping and the scarcity of good reference points there is considerable uncertainty in the dose-rate lines. A resurvey was made 7 months later with reference stakes available at half-mile intervals, so that the location of the fallout detected is much more certain than in the initial survey. However, because of the probable reduction in radiation by weathering and the errors probably attendant in assuming the t-1.2 decay approximation to be valid for such a long period, the H+1 dose rates were estimated from the initial survey. There is an order of magnitude discrepancy in the estimation of the H+1 hour dose rates from the early to late survey; therefore there is very little confidence in the accuracy of the pattern.

Off-site air sampling showed a significant increase in alpha activity. The beta measurements indicate that some light fallout did occur off site.

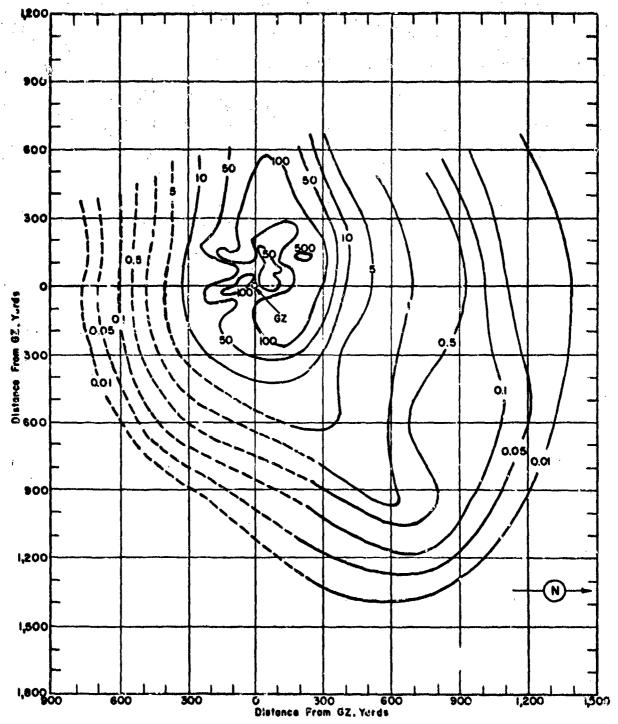


Figure 506. Operation HARDTACK II - Blanca.
Close-in dose rate contours in r/hr at H+1 hour.

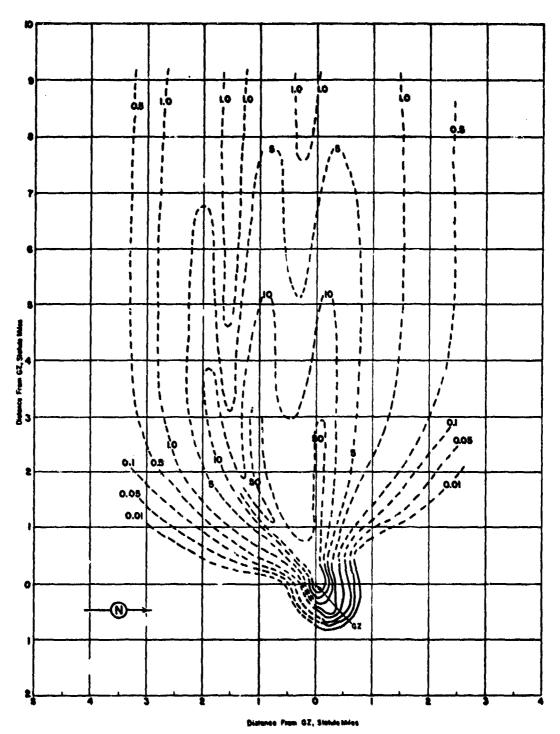


Figure 307. Operation HARDTACK II - Blanca.
On-site dose rate contours in r/hr at H+l hour.

TABLE 102 NEVADA WIND DATA FOR OPERATION HARDIACK II -

RIANCA

Altitude	H+53 hours			
(MSL)	Dir	Speed		
feet	degrees	mph		
Surface	80	09		
5,000	60	15		
6,000	60	15		
7,000	60	14		
8,000	70	13		

NOTE: Wind data was obtained from the Yucca weather station.

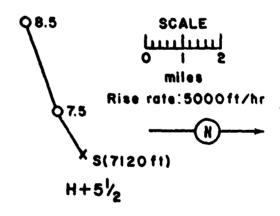


Figure 308. Hodograph for HARDTACK II -

Blanca.

# OPERATION HARDTACK II - Titania Safety Experiment

PST GMT Sponsor: UCRL

DATE: 30 Oct 1958 30 Oct 1958
TIME: 1234 2034 SITE: NTS - Area Sc

70° 10' 38" N

TOTAL YIELD: 0.2 tons

116° 04' 09" W

Site elevation: 4,403 ft

FIREBALL DATA:

Time to 1st minimum: NM HEIGHT OF BURST: 25 ft
Time to 2nd maximum: NM
Radius at 2nd maximum: NM TYPE OF BURST AND PLACEMENT:

Tower burst over Nevada soil

CLOUD TOP HEIGHT: 6,000 ft MSL

CLOUD BOTTOM HEIGHT: NM

## REMARKS:

The on-site fallout documentation was performed by the Radiological Safety Division of the Reynolds Electrical and Engineering Company for purposes of personnel safety. Readings were taken with AN/PDR-39 or Tracerlab SU-10 instruments at  $H^{+\frac{1}{2}}$  hour. The  $t^{-1\cdot 2}$  decay approximation was used to extrapolate the readings to H+1 hour. The pattern presented is not reliable.

No off-site contamination was detected.

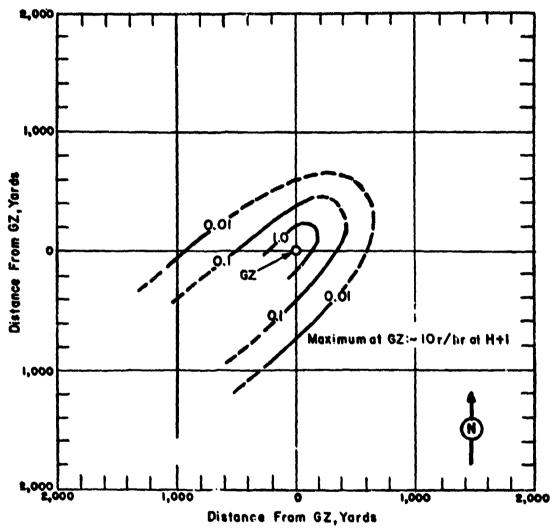


Figure 309. Operation HARDTACK II - Titania.
On-site dose rate contours in r/hr at H+l hour.

Altitude H-ho		ur	H+2 hour		H+13 hours	
(msl)	Dir	Speed	Dir	Speed	Dir	Speed
feet	degrees	mph	degrees	mph	degrees	mbp
Surface	80	09	80	12	. 90	11
5,000	60	15				
6,000	60	15		,		**
7,000	60	14				
8,000	70	13			6146	

NOTES:

- H-hour data taken from Yucca Lake Weather Station (Elevation
- 3,924 ft MSL).

  2. H+½ hour and H+1½ hours data from 20-foot tower at Station 353 (Surface Elevation about 4,325 ft MSL).

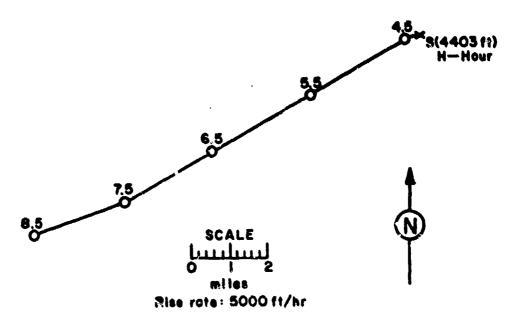


Figure 310. Hodograph for Operation HIRDMCK II -

Titania.

OPERATION NOUGAT -

Antler

DATE: 15 Sep 1961 15 Sep 1961 TIME: 0900

1700

TOTAL YIELD: 2.4 kt

CRATER DATA: No crater

SPONSOR: LRL

SITE: NTS - Ul2c.03a

37° 11' 16.6430" N 116° 12' 27.9248" W

SITE ELEVATION: 7428 ft MSL

DEPTH OF BURST: 1319 ft

TYPE OF BURST AND PLACEMENT: Tunnel, in semiwelded tuff

## STEMMING MATERIAL:

Tunnel - bedded tuff rhyolite to quartz latite and bedded tuff wellcemented,

## **VENTING:**

Venting occurred at the tunnel portal at B+2 seconds for an unknown A secondary steam explosion was observed from 8 to 10 minutes following the detonation.

The estimated dose rate at the tunnel portal, normalized to litl hour, was 50 R/hr. The estimated total release, normalized to H+1 minute, was 5x10 g curies and contained the following isotopes: I131, I133, I135, Ba-Lal4 0

## REMARKS:

Some radioactivity was detected in off-site areas. No radiation was detected at the worksite or any other location, from releases of gaseous radioactivity during post-shot drilling or tunnel re-entry operations.

OPERATION NOUGAT -

Shrew

PST 16 Sep 1961 16

GMT 16 Sep 1961

TIME: 1145 1945

SI ONSOR: LASL

SITE: NTS - U3ac

37° 02' 54.4373" N 116° 01' 29.5908" W

DEPTH OF BURST: 322 ft

TYPE OF BURST AND PLACEMENT:

Underground, in slightly consolidated alluvium

# VENTING:

This event released small visible quantities of radioactive steam and/or gases.

## REMARKS:

Radiation was detected on-site from radioactivity released by this detonation, but no radiation levels above background were detected off the NTS in populated areas. No radiation was detected at the worksite or any other location, from releases of gaseous radioactivity during post-shot drilling.

Chena

PST GMT

DATE: 10 Oct 1961 10 Oct 1961

TIME: 1000 1800

SPONSOR: LKL

SITE: NTS - U12b.09

37° 11' 39.4418" N 116° 12' 25.2736" W

SITE ELEVATION: 7472 ft MSL

DEPTH OF BURST: 838 ft

TYPE OF BURST AND PLACEMENT:
Tunnel, in slightly competent
tuff

#### **VENTING:**

Venting occurred at the tunnel portal at H+2 seconds and continued for approximately 20 minutes.

The estimated dose rate at the tunnel portal, normalized to H+1 hour, was 35 R/hr. The estimated total release, normalized to H+1 minute, was  $2 \times 10^6$  curies. The identities of the release products are not available.

## REMARKS:

No radiation levels above background were detected off the NTS in populated areas from radioactivity released by this detonation. No radiation was detected at the worksite or at any other location, from releases of gaseous radioactivity during post-shot drilling or tunnel re-entry operations.

Mink

PST GMT

DATE: 29 Oct 1961 29 Oct 1961

TIME: 1030 1830

SPONSOR: LASL

SITE: NTS - U3ae

37° 02' 54.8432" N 116° 01' 51.9485" W

SITE ELEVATION: 4028 ft MSL

DEPTH OF BURST: 630 ft

DEPTH OF EMPLACEMENT HOLE: 640 ft

TYPE OF BURST AND PLACEMENT:

Underground, in alluvium

## VENTING:

Some gas seepage was evidenced at H+25 minutes.

## **REMARKS:**

Radiation was detected on-site from radioactivity released by this detonation. Produced measurable contamination of off-site milk supplies caused levels of contamination in milk in Hiko, Nevada, to jump to 720 pc/£, 4 days after the shot.

Some radiation was detected in the areas surrounding SZ from gaseous radioactivity released during post-shot drilling. No radiation was detected off the NTS from post-shot operations.

Fisher

3 Dec 1961 DATE: 3 Dec 1961 TIME: 1504 2304

TOTAL YIELD: 13.5 kt

116° 01' 39.6325" W DEPTH OF BURST: 1193 ft

SITE: NTS - U3ah

LASL

SPONSOR:

CRATER DATA:

Subsidence crater Diameter: 650 ft Depth:

70 ft

TYPE OF BURST AND PLACEMENT: Underground, in alluvium

37° 02' 45.0854" N

# VENTING:

This event released small visible quantities of radioactive steam and/or gases.

# REMARKS:

Radiation was detected on-site from radioactivity released by this detonation. No radiation levels above background were detected off the NTS in populated areas from radioactivity released by this detonation.

Some radiation was detected in the area surrounding SZ from gaseous radioactivity released during post-shot drilling.

#### PROJECT GNOME

MST GMT SPONSOR: LRL VTE: 10 Dec 1961 10 Dec 1961

TIME: 1200 1900 SITE; Near Carlsbad, New Mexico

32° 15' 49" N TOTAL YIELD: 3.1 kt 103° 5' 57" W

SITE ELEVATION: 3395 ft MSL

CRATER DATA:
No crater
DEPTH OF BURST: 1184 ft

TYPE OF BURST AND PLACEMENT:
Underground, in bedded rock

salt

#### VENTING:

Radiation was detected at the blast door at the bottom of the shaft less than one minute following the explosion; and at the shaft collar, 3 minutes and 40 seconds after the detonation. At approximately 7 minutes after the detonation, gray smoke, steam, and associated radioactivity surged from the shaft opening. By 11 minutes following the explosion, copious quantities of steam were issuing from both shaft and ventilation lines. A large flow continued for about 30 minutes before gradually decreasing. A small flow was still detected the following day. The radioactive elements that vented through the shaft were volatile and noble gases.

#### REMARKS:

Figure 8 shows the measured cloud pattern and times of measurement. All readings are gross gamma measured inside the aircraft. Attenuation of radiation by the aircraft structure was not determined, but was probably in the range of 30 to 50 percent.

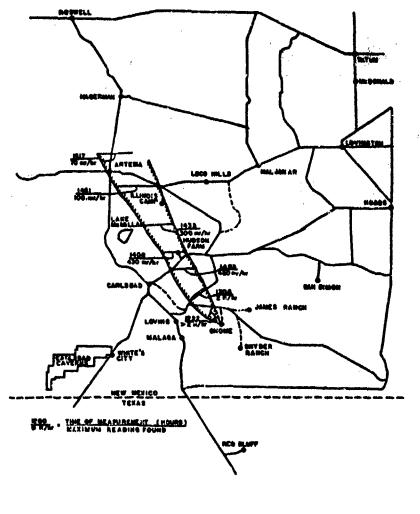
#### Meteorological Information:

Wind at the surface: 150 degrees - 4.6 mph

Wind at 100 feet: 140 degrees - 16 mph

Surface air temperature: 45.3°F

Surface relative humidity: 72% Surface atmospheric pressure: 26.74 inches of mercury



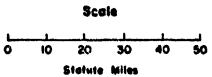


Figure 311, Project Gnome - Cloud pattern as found by Aerial Monitoring

Mad

PST GMT

DATE: 13 Dec 1961 13 Dec 1961

Dec 1961

<u>TIME: 1000</u>

1800 SITE: NTS - U9a

TOTAL YIELD: 0.43 kt

37° 07' 35.77" N 116° 02' 55.54" W

CRATER DATA: No crater

DEPTH OF BURST: 594 ft

TYPE OF BURST AND PLACEMENT:

SPONSOR: LRL

Underground, in slightly consolidated alluvium

## **VENTING:**

This event released small visible quantities of radioactive steam and/or gases.

## **REMARKS:**

Radiation was detected on-site from radioactivity released by this detonation. No radiation levels above background were detected off the NTS in populated areas from radioactivity released by this detonation.

No radiation was detected at the worksite or any other location, from releases of gaseous radioactivity during post-shot drilling.

Ringteil

 DATE:
 TYST
 GMT

 17 Dec 1961
 17 Dec 1961

 TIME:
 0835
 1635

SPONSOR: LASL

SITE: NTS - U3ak

37° 02' 35.38" N 116° 01' 31.13" W

DEPTH OF BURST: 1191 ft

TYPE OF BURST AND PLACEMENT: Underground, in alluvium

# **VENTING:**

This event released small visible quantities of radioactive steam and/or gases.

# REMARKS:

Radiation was detected on-site from radioactivity released by this detonation. No radiation levels above background were detected off the NTS in populated areas, from radioactivity released by this detonation.

No radiation was detected at the worksite or any other location from releases of gaseous radioactivity during post-shot drilling.

Feather

PST GMT

DATE: 22 Dec 1961 22 Dec 1961

TIME: 0830 1630

SPONSOR: LRL

SITE: NTS - U12b.08 37° 11' 41.76" N 116° 12' 29.84" W

SITE ELEVATION: 7449 ft MSL

DEPTH OF BURST: 812 ft

TYPE OF BURST AND PLACEMENT:
Tunnel, in competent to
incompetent tuff.

THE COUNTY OF THE PARTY OF THE

## **VENTING:**

At H hour a small cloud which appeared to be typical gas-venting, rose from a tunnel portal and vent pipes on top of the mesa and endured for 11 minutes.

The estimated dose rate at the tunnel portal, normalized to H+1 hour, was 18 R/hr. The estimated total release, normalized to H+1 minute, was  $1 \times 10^6$  curies. The isotope identities are not available.

## REMARKS:

At H+30 minutes a branch tunnel was monitored at 40 mR/hr, and  $\epsilon$  location 1/2 mile southwest and downwind from the venting origin was monitored to be 100 mR/hr at the same time.

Some radioactivity was detected in off-site areas. No radiation was detected at the worksite or any other location, from releases of gaseous radioactivity during post-shot drilling or tunnel re-entry operations.

Stoat

PST GMT

9 Jan 1962 9 Jan 1962 TIME: 0830 1630

TOTAL YIELD: 4.5 kt

SPONSOR: LASL

SITE: NTS - U3ap

37° 02' 40.70" N 116° 02' 06.23" W

DEPTH OF BURST: 992 ft

CRATER DATA:

Subsidence crater Diameter: 356 ft Depth:

7 ft

TYPE OF BURST AND PLACEMENT: Underground, in alluvium

VENTING: ·

Vented

REMARKS:

Radiation was detected on-site from radioactivity released by this detonation. No radiation levels above background were detected off the NTS in populated areas, from radioactivity released by this detonation.

Some radiation was detected in the area surrounding SZ from gaseous radioactivity released during post-shot drilling. No radioactivity was detected off the NTS from post-shot operations.

Agouti

**PST** 18 Jan 1962 18 Jan 1962 DATE:

SPONSOR: LASL

1000 TIME:

TOTAL YIELD: 5.9 kt

1800

SITE: NTS - U3ao 37° 02' 50.08" N

116° 02' 03.69" W

DEPTH OF BURST: 856 ft

CRATER DATA:

Subsidence crater Diameter: 500 ft 50 ft .opth:

TYPE OF BURST AND PLACEMENT: Underground, in alluvium

VENTING:

None

REMARKS:

No 1 dation levels above background were detected on or off the NTS, from radioactivity released by this detonation.

diation was detected at the worksite or any other location, from 1 ses of gaseous radioactivity during post-shot drilling.

Dormouse

 DATE:
 30 Jan 1962
 30 Jan 1962

 TIME:
 1000
 1800

SPONSOR: LASL

SITE: NTS - U3aq

37° 02' 48.64" N 116° 02' 22.14" W

DEPTH OF BURST: 1191 ft

TYPE OF BURST AND PLACEMENT: Underground, in alluvium

## VENTING:

This event released small visible quantities of radioactive steam and/or gases.

## REMARKS:

Radiation was detected on-site from radioactivity released by this detonation. No radiation levels above background were detected off the NTS in populated areas from radioactivity released by this detonation.

Some radiation was detected in the area surrounding SZ from gaseous radioactivity released during post-shot drilling. No radioactivity was detected off the NTS from post-shot operations.

Stillwater

PST GMT

DATE: 8 Feb 1962 8 Feb 1962

TIME: 1000 1800

TOTAL YIELD: 2.7 kt

SPONSOR: LRL

SITE: NTS - U9c

37° 07' 38.09" N 116° 03' 09.15" W

SITE ELEVATION: 4208 ft MSL

CRATER DATA:

Subsidence crater
Diameter: 450 ft
Depth: 32 ft

DEPTH OF BURST: 625 ft

TYPE OF BURST AND PLACEMENT:

consolidated alluvium

Underground, in slightly

**VENTING:** 

None, except during post-shot drilling

REMARKS:

No radiation levels were detected above background on or off the NTS, from radioactivity released by this detonation.

Some radiation was detected in the area surrounding SZ from gaseous radioactivity released during post-shot drilling. No radioactivity was detected off the NTS from post-shot operations.

Armadillo

PST GMT DATE: 9 Feb 1962

TIME: 1000

9 Feb 1962 1800

TOTAL YIELD: 6.6 kt

CRATER DATA:

Subsidence crater Diameter: 500 ft 35 ft Depth:

VENTING: Vented

**REMARKS:** 

SPONSOR: LASL

SITE: NTS - U3ar

37° 02' 36.88" N 116° 02' 20.24" W

DEPTH OF BURST: 786 ft

TYPE OF BURST AND PLACEMENT: Underground, in alluvium

Radiation was detected on-site from radioactivity released by this detonation. No radiation levels above background were detected off the NTS in populated areas from radioactivity released by this detonation.

Some radiation was detected in the area surrounding SZ from gaseous radioactivity released during post-shot drilling. No radioactivity was detected off the NTS from post-shot operations.

Hardhat

PST GMT SPONSOR: DOD

DATE: 15 Feb 1962 15 Feb 1962 TIME: 1000 1800 SITE: NTS - U15a

TOTAL YIELD: 5.9 kt 37° 13! 34.7140" N

SITE ELEVATION: 5114 ft MSL

CRATER DATA:

No crater

DEPTH OF BURST: 943 ft

VENTING:

Vented

TYPE OF BURST AND PLACEMENT:

Underground, bottom of 36inch-diameter shaft in

grandodiorite

#### **REMARKS:**

Radiation was detected on-site from radioactivity released by this detenation. No radiation levels above background were detected off the NTS in populated areas from radioactivity released by this detonation.

Some radiation was detected in the area surrounding SZ from gaseous radioactivity released during post-shot drilling. No radioactivity was detected off the NTS from post-shot operations.

#### Chinchilla I

PST GMT SPONSOR: LASL DATE: 19 Feb 1962 19 Feb 1962

TIME: 0830 1630 SITE: NTS - U3ag

37° 02' 56.5909" N
TOTAL YIELD: 1.8 kt 116° 01' 46.3128" W

DEPTH OF BURST: 492 ft

CRATER DATA:

Subsidence crater

Diameter: 300 ft

TYPE OF BURST AND PLACEMENT:
Underground, in alluvium

Depth: 50 ft

# VENTING:

This event released small visible quantities of radioactive steam and/or gases.

# REMARKS:

Radiation was detected on-site from radioactivity released by this detonation. No radiation levels above background were detected off the NTS in populated areas from radioactivity released by this detonation.

Some radiation was detected in the area surrounding SZ from gaseous radioactivity released during post-shot drilling. No radioactivity was detected off the NTS from post-shot operations

Codsaw

PST GMT

DATE: 19 Feb 1962 19 Feb 1962

TIME: 0950 1750

SPONSOR: LRL

SITE: NTS - U9g

37° 07' 38.8308" N 116° 02' 13.63" W

SITE ELEVATION: 4218 ft MSL

DEPTH OF BURST: 696 ft

TYPE OF BURST AND PLACEMENT:

Underground, in semiwelded tuff

VENTING: Vented

## **REMARKS:**

Radiation levels were detected near SZ, above normal background, from radioactivity released by this detonation. No other radiation levels were detected on or off the NTS, from radioactivity released by this detonation.

No radiation was detected at the worksite or any other location from releases of gaseous radioactivity during post-shot drilling.

Cimarron

PST GMT SPONSOR: LRL

DATE: 23 Feb 1962 23 Feb 1962 TIME: 1000 1800 SITE: NTS - U9h

TOTAL YIELD: 11.2 kt 37° 07' 43.88" N 116° 02' 53.91" W

SITE ELEVATION: 4208 ft MSL \*

CRATER DATA:

Subsidence crater DEPTH OF BURST: 1000 ft

Diameter: 500 ft
Depth: 40 ft TYPE OF BURST AND PLACEMENT:

Underground, in slightly con-VENTING: solidated alluvium

None except during post-shot drilling

## REMARKS:

No radiation levels above background were detected on or off the NTS, from radioactivity released by this detonation.

Some radiation was detected in the area surrounding SZ from gaseous radioactivity released during post-shot drilling. No radioactivity was detected off the NTS, from post-shot operations.

## Platypus

	PST	GMT	
DATE:	24 Feb 1962	24 Feb 1962	
TIME:	0830	1630	

SPONSOR: LASL

SITE: NTS - U3ad 37° 02' 54" N 116° 01' 54.85" W

DEPTH OF BURST: 190 ft

TYPE OF BURST AND PLACEMENT: Underground, in alluvium

VENTING: Vented

# REMARKS:

Radiation was detected on-site from radioactivity released by this detonation. No radiation levels above background were detected off the NTS in populated areas from radioactivity released by this detonation.

No radiation was detected at the worksite or any other location from releases of gaseous radioactivity during post-shot drilling.

Pampas

PST GMT

DATE: 1 Mar 1962 1 Mar 1962

TIME: 1110 1910

SPONSOR: LASL/UK

SITE: NTS - U3al 37° 02' 30.34" N

116° 01' 44.799" W

SITE ELEVATION: 4012 ft MSL

DEPTH OF BURST: 1191 ft

DEPTH OF EMPLACEMENT HOLE: 1201 ft

TYPE OF BURST AND PLACEMENT: Underground, in alluvium

## VENTING:

Immediately after detonation, two small clouds floated around in Area 3.

## **REMARKS:**

A maximum dose rate reading of 37 mR/hr at H+45 minutes was evidenced at the BUSTER JANGLE Y (BJY) of the NTS road network. Some radioactivity was detected in off-site areas. Some radiation was detected in the area surrounding SZ from gaseous radioactivity released during post-shot drilling. No radioactivity was detected off the NTS from post-shot operations.

Danny Boy

PST GMT SPONSOR: LRL/DOD

DATE: 5 Mar 1962 5 Mar 1962 TIME: 1015 1815 SITE: NTS - Area 18

37° 06' 39.79" N TOTAL YIELD: 0.42 kt 116° 21' 53.82" W

SITE ELEVATION: 5477 ft MSL

CRATER DATA:

Diameter: 214 ft DEPTH OF BURST: 110 ft

Depth: 62 ft
TYPE OF BURST AND PLACEMENT:

Underground, in basalt

## **VENTING:**

A persistent cloud was produced containing appreciable quantities of radioactivity associated with particulates

#### **REMARKS:**

The close-in and distant fallout documentation (Figures 1 and 2) was performed by the NDL. AN/PDR-39A ion-chamber instruments were used to measure field gamma dose rates. Most of the measurements from 2,500 ft to 25,000 ft from GZ were accomplished from H+2 hours to H+29 hours. Ground surveys beyond 2,500 ft downwind from GZ continued through D+9 days. The area from GZ to a distance of 2,500 ft downwind was surveyed at later times. The dose-rate readings were extrapolated to H+1 hour using a decay approximation.

The dotted portions of the patterns indicate uncertainty.

The off-site patterns (Figs.314 & 315) were constructed from aerial survey measurements performed by EG&G and the USGS. The EG&G survey which took place from H+5 to H+7 hours, defines the pattern from miles to approximately 25 miles. Two days later the long-range survey out to 140 miles was made by the USGS.

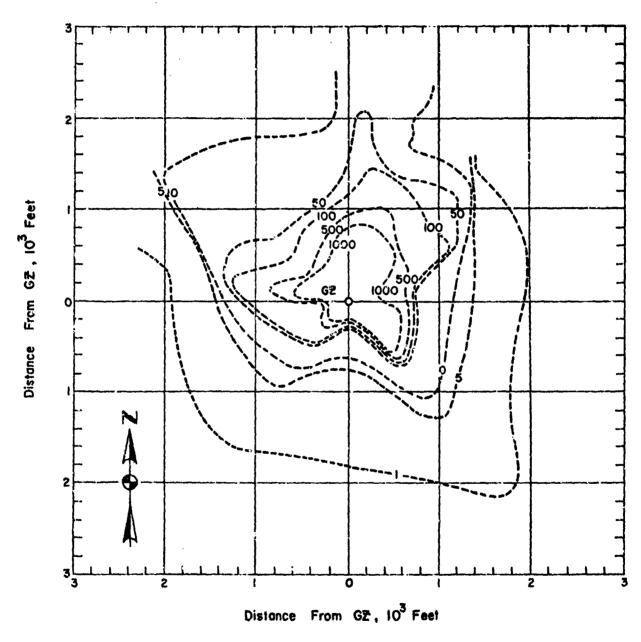


Figure 312 OPERATION NOUGAT - Danny Boy contours of residual radiation in R/hr at H+1 hour to 2,000 feet downwind

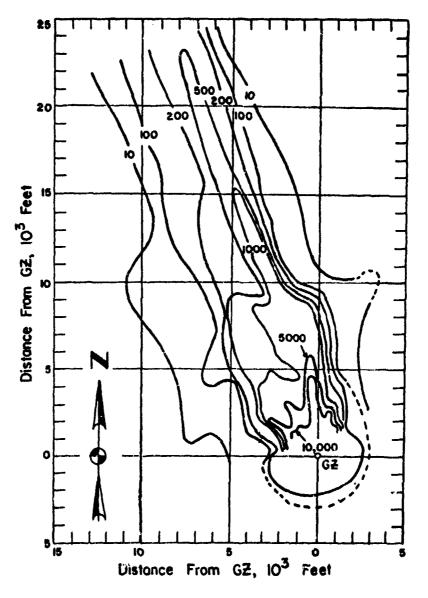


Figure 313 OPERATION NOUGAT - Danny Boy contours of residual gamma radiation in mR/hr at H+1 hour to 25,000 feet downwind

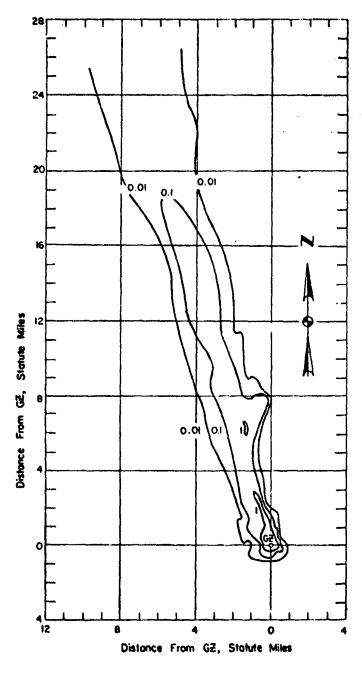


Figure 314 OPERATION NOUGAT - Danny Boy contours of residual gamma radiation in R/hr at H+1 hour to 26 miles downwind

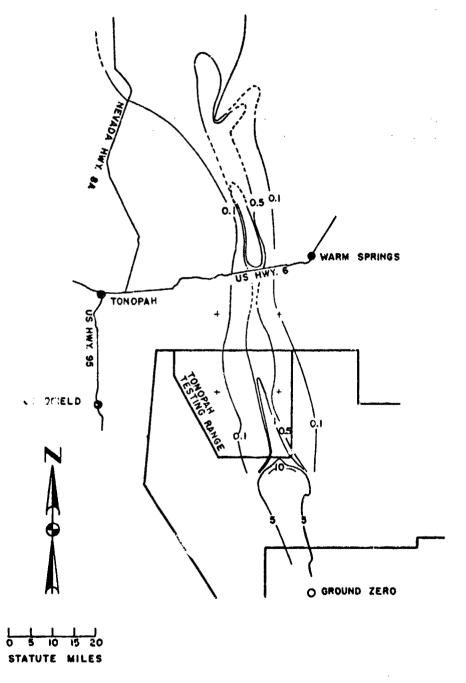


Figure 315.OPERATION NOUGAT - Danny Boy contours of residual gamma radiation in mR/hr at H+1 hour to 140 miles downwind

TABLE 104 NEVADA WIND DATA FOR OPERATION NOUGAT -

DANNY BOY

Altitude	H+10 minutes	
(MSL)	Direction	Speed
feet	degrees	mph
5,477	170	13.8
6,000	174	15.0
7,000	178	17.3
8,000	184	23.0
9,000	190	31.1
10,000	191	34.5
11,000	195	39.1
12,000	199	42.6
13,000	202	52.9
14,000	206	54.1

# Notes

- 1. Observations made at Area 18 radar site.
- 2. Atmospheric pressure was 832 millibars, the temperature was 5.3°C, the dew point temperature was -12.2°C, and the relative humidity was 27% at GZ at 1015 PST.

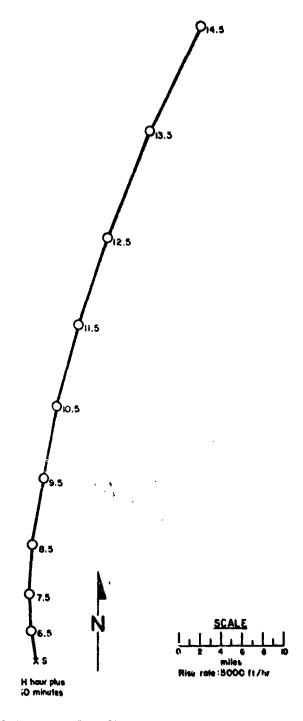


Figure 316, Hodograph for OPERATION NOUGAT -

Danny Boy.

Ermine

PST GMT

DATE: 6 Mar 1962 6 Mar 1962

TIME: 0830 1630

SPONSOR: LASL

SITE: NTS - U3ab

37° 02' 54.233" N 116° 02' 01.165" W

DEPTH OF BURST: 240 ft

TYPE OF BURST AND PLACEMENT: Underground, in alluvium

VENTING:

None except during post-shot drilling

# REMARKS:

No radiation levels were detected above background on or off the NTS from radioactivity released by this detonation.

Some radiation was detected in the area surrounding SZ from gaseous radioactivity released during post-shot drilling. No radioactivity was detected off the NTS from post-shot operations.

#### Brazos

PST GMT

DATE: 8 Mar 1962 8 Mar 1962

TIME: 1000 1800

TOTAL YIELD: 7.6 kt

TOTAL TIBED. 7.0 KI

CRATER DATA:

Subsidence crater
Diameter: 450 ft
Depth: 40 ft

SPONSOR: LRL

SITE: NTS - U9d

37° 07' 19.7891" N 116° 02' 55.9678" W

SITE ELEVATION: 4201 ft MSL

DEPTH OF BURST: 841 ft

TYPE OF BURST AND PLACEMENT: Underground, in slightly consolidated alluvium

# **VENTING:**

This event released small visible quantities of radioactive steam and/or gases.

#### REMARKS:

Radiation was detected on-site from radioactivity released by this detonation. No radiation levels above background were detected off the NTS in populated areas from radioactivity released by this detonation. Some radiation was detected in the area surrounding SZ from gaseous radioactivity released during post-shot drilling. No radioactivity was released from post-shot operation.

Hognose

PST GMT

DATE: 15 Mar 1962 15 Mar 1962

TIME: 0830 1630

SPONSOR: LASL

SITE: NTS - U3ai

37° 02' 38.269" N 116° 01' 51.774" W

DEPTH OF BURST: 789 ft

TYPE OF BURST AND PLACEMENT: Underground, in alluvium

## VENTING:

None except during post-shot drilling

## **REMARKS:**

No radiation levels were detected above background on or off the NTS from radioactivity released by this detonation. Some radiation was detected in the area surrounding SZ from gaseous radioactivity released during post-shot drilling. No radioactivity was detected off the NTS from post-shot operations.

Hoosic

PST GMT SPONSOR: LRL DATE: 28 Mar 1962 28 Mar 1962

TIME: 1000 1800 SITE: NTS - U9j

37° 07' 27.5474" N TOTAL YIELD: 3 kt 116° 02' 01.9685" W

SITE BLEVATION: 4235 ft MSL

CRATER DATA:

Subsidence crater DEPTH OF BURST: 614 ft

Diameter: 310 ft
Depth: 25.3 ft
TYPE OF BURST AND PLACEMENT:

Underground, in tuff below

alluvium

VENTING:

None except during post-shot drilling

## REMARKS:

No radiation levels were detected above background on or off the NTS from radioactivity released by this detonation. Some radiation was detected in the area surrounding SZ from gaseous radioactivity released during post-shot drilling. No radioactivity was detected off the NTS from post-shot operations.

Chinchilla II

PST GMT

DATE: 31 Mar 1962 31 Mar 1962

TIME: 1000 1800

SPONSOR: LASL

SITE: NTS - U3as

37° 02' 48.874" N 116° 02' 12.850" W

SITE ELEVATION: 4026 ft MSL

DEPTH OF BURST: 448 ft

DEPTH OF EMPLACEMENT HOLE: 458 ft

CLOUD TOP HEIGHT: 5500 ft MSL

TYPE OF BURST AND PLACEMENT: Underground, in alluvium

## **VENTING:**

A dust cloud was observed at H hour.

## **REMARKS:**

A maximum radiation reading of 20 mR/hr was located at SZ at H+4 minutes. Some other radiation levels above normal background were detected near SZ. No other radiation levels were detected on or off the NTS from radioactivity released by this detonation. Some radiation was detected in the area surrounding SZ from gaseous radioactivity released during post-shot drilling. No radioactivity was detected off the NTS from post-shot operations.

# OPERATION NOUGAT - Dormouse II

PST GMT
5 Apr 1962 5 Apr 1962

DATE: 5 Apr 1962 5 Apr TIME: 1000 1800

TOTAL YIELD: 10 kt

SPONSOR: LASL

SITE: NTS - U3az

37° 02' 40.219" N 116° 01' 24.720" W

DEPTH OF BURST: 856 ft

CRATER DATA:

Subsidence crater
Diameter: 560 ft
Depth: 87 ft

TYPE OF BURST AND PLACEMENT: Underground, in alluvium

VENTING:

None except during post-shot drilling

## REMARKS:

No radiation levels were detected above background on or off the NTS from radioactivity released by this detonation. Some radiation was detected in the area surrounding SZ from gaseous radioactivity released during post-shot drilling. No radioactivity was detected off the NTS from post-shot operations.

Passaic

PST GMT

DATE: 6 Apr 1962 6 Apr 1962

TIME: 1000 1800

SPONSOR: LRL

SITE: NTS-U91

37° 07' 03.6276" N 116° 02' 38.4413" W

SITE ELEVATION: 4183 ft MSL

DEPTH OF BURST: 764 ft

TYPE OF BURST AND PLACEMENT: Underground, alluvium

tuff contact

**VENTING:** 

None, except during post-shot drilling

## REMARKS:

No radiation levels were detected above background on or off the NTS, from radioactivity released by this detonation. Some radiation was detected in the area surrounding SZ from gaseous radioactivity released during post-shot drilling. No radioactivity was detected off the NTS from post-shot operations.

Hudson

 DATE:
 12 Apr 1962
 12 Apr 1962

 TIME:
 1000
 1800

SPONSOR: LRL

SITE: NTS - U9h

37° 07' 37.8426" N 116° 02' 41.5226" W

SITE ELEVATION: 4200 ft MSL

DEPTH OF BURST: 480 ft

VENTING:
None, except during
post-shot drilling

TYPE OF BURST AND PLACEMENT:
Underground, in slightly
consolidated alluvium

## REMARKS:

No radiation levels were detected above background on or off the NTS from radioactivity released by this detonation. Some radiation was detected in the area surrounding SZ from gaseous radioactivity released during post-shot drilling. No radioactivity was detected off the NTS from post-shot operations.

Platte

PST GMT DATE: 14 Apr 1962 14 Apr 1962

TIME: 1000 1800

TOTAL YIELD: 1.7 kt

CRATER DATA: No crater

CLOUD TOP HEIGHT: 8000 ft MSL

SPONSOR: LRL

SITE: NTS - U12k.01

37° 13' 19.26" N

116° 09' 26.77" W

SITE ELEVATION: 6281 ft MSL

DEPTH OF BURST: 628 ft

SLANT DEPTH: 560 ft

TYPE OF BURST AND PLACEMENT:

Tunnel, in weakly consolidated tuff

## STEMMING MATERIAL:

Tunnel - interbedded brown sandy tuff and yellow-gray lapilli tuff

#### VENTING:

Venting occurred at the tunnel portal, through fissures, and at a vent hole at H+1.5 seconds. The fissures were created on the side of the hill, and radial cracks formed on top of the hill A persistent cloud was produced containing appreciable quantities of radioactivity associated with particles The estimated dose rate at the tunnel portal, normalized to H-1 hour, was 20 R/hr and the estimated total release, normalized to H+1 minute, was  $5 \times 10^7$  curies. The release products contained the following known isotopes:  $Ru^{103}$ ,  $Ru^{105}$ ,  $Zr-Nb^{95}$ ,  $Ca^{141}$ ,  $Ca^{144}$ ,  $K^{40}$ ,  $I^{131}$ ,  $I^{133}$ ,  $I^{135}$ ,  $Te^{133}$ 

## REMAPKS:

The cloud drifted in a northerly direction. The radiation area at H+4.5 hours extended upwind approximately one mile from GZ and was monitored at 10 mR/hr. Some radioactivity was detected in off-site areas. No radiation was detected at the worksite or any other location from releases of gaseous radioactivity during post-shot drilling or turnel re-entry operations.

Dead

PST GMT

DATE: 21 Apr 1962 21 Apr 1962

TIME: 1040 1840

SPONSOR: LRL

SITE: NTS - U9k

37° 07' 08.4176" N 116° 01' 53.4847" W

SITE ELEVATION: 4261 ft MSL

DEPTH OF BURST: 634 ft

TYPE OF BURST AND PLACEMENT: Underground, in alluvium

#### VENTING:

None, except during post-shot drilling

# REMARKS:

No radiation levels were detected above background on or off the NTS from radioactivity released by this detonation. Some radiation was detected in the area surrounding SZ from gaseous radioactivity released during post-shot drilling. No radioactivity was detected off the NTS from post-shot operations.

Black

PST GMT

DATE: 27 Apr 1962 27 Apr 1962

TIME: 1000 1800

SPONSOR: LRL

SITE: NTS-U9p

37° 07' 06.4610" N 116° 02' 15.9730" W

SITE ELEVATION: 4217 ft MSL

DEPTH OF BURST: 714 ft

TYPE OF BURST AND PLACEMENT:

Underground, in tuff below alluvium

**VENTING:** 

None, except during post-shot drilling

## REMARKS:

No radiation levels were detected above background on or off the NTS from radioactivity released by this detonation. Some radiation was detected in the area surrounding SZ from gaseous radioactivity released during post-shot drilling. No radioactivity was detected off the NTS from post-shot operations.

Paca

PST GMT

DATE: 7 May 1962 7 May 1962

TIME: 1133 1933

SPONSOR: LASL

TTE: NTS - U3ax 37° 02' 47.6237" N 116° 01' 30.0318" W

DEPTH OF BURST: 848 ft

TYPE OF BURST AND PLACEMENT: Underground, in alluvium

### VENTING:

None, except during post-shot drilling

### REMARKS:

No radiation levels were detected above background on or off the NTS from radioactivity released by this detonation. Some radiation was detected in the area surrounding SZ from gaseous radioactivity released during post-shot drilling. No radioactivity was detected off the NTS from post-shot operation.

Aardvark

GMT

SPONSOR: LASL

DATE: 12 May 1962 TIME: 1100

12 May 1962 1900

NTS - U3ams SITE:

37° 03' 54.6976" N 116° 01' 49.3656" W

TOTAL YIELD: 38 kt

DEPTH OF BURST: 1424 ft

CRATER DATA:

Subsidence crater Diameter: 950 ft 75 ft Depth:

TYPE OF BURST AND PLACEMENT:

Underground, in tuff

**VENTING:** 

Vented

**REMARKS:** 

Radiation was detected on-site from radioactivity released by this detonation. No radiation levels above background were detected off the NTS in populated areas from radioactivity released by this detonation. Some radiation was detected in the area surrounding SZ from gaseous radioactivity released during post-shot drilling. No radioactivity was detected off the NTS from post-shot operations.

Eel

PST GMT

DATE: 19 May 1962 19 May 1962

TIME: 0700 1500

SPONSOR: LRL

SITE: NTS - U9m 37 07' 21.49" N

116° 02' 49.9561" W

SITE ELEVATION: 4199 ft MSL

DEPTH OF BURST: 714 ft

TYPE OF BURST AND PLACEMENT: Underground, in alluvium

# VENTING:

Venting in the form of a geyser, occurred at H+10 seconds at vent hole U9m-2 and continued steadily until H+19 minutes 42 seconds. A similar venting occurred at H+15 seconds at vent hole U9-m3 and lasted until H+21 minutes.

The venting ceased with crater subsidence

The normalized H+1 hour estimated dose rate at 500 feet
from SZ and the normalized H+1 minute estimated total releases respectively are: 7 R/hr and 5xl0<sup>5</sup> curies. The known isotopes are: Ru<sup>105</sup>, Ru<sup>106</sup>, Rh<sup>105</sup>, Zr-Nb<sup>95</sup>, Ce<sup>141</sup>, Ce<sup>144</sup>, I<sup>131</sup>, I<sup>132</sup>, I<sup>135</sup>, Te<sup>132</sup>, and Ba-La<sup>140</sup>.

#### REMARKS:

Some radioactivity was detected in off-site areas. No radiation was detected at the worksite or any other location from releases of gaseous radioactivity during post-shot drilling,

At H+30 minutes readings at 1000 feet from SZ varied between 250 and 500 mR/hr with the exception of a location 1000 feet north of SZ where readings continued at more than 100 R/hr contrary to prediction.

White

PST GMT

DATE: 25 May 1962 25 May 1962

TIME: 0700 1500

SPONSOR: LRL

SITE: NTS - U9b

37° 07' 29.4725" N 116° 03' 07.1518" W

SITE ELEVATION: 4200 ft MSL

DEPTH OF BURST: 635 ft

TYPE OF BURST AND PLACEMENT:
Underground, in alluvium (tuff)

VENTING:

None, except during post-shot drilling

### REMARKS:

No radiation levels were detected above background on or off the NTS from radioactivity released by this detonation. Some radiation was detected in the area surrounding SZ from gaseous radioactivity released during post-shot drilling. No radioactivity was detected off the NTS from post-shot operations.

Raccoon

PST **GMT** DATE: 1 Jun 1962 1 Jun 1962

TIME: 0900 1700 SPONSOR: LASL

SITE: 37° 02' 44.206" N

NTS - U3ajs

116° 02' 04.059" W

DEPTH OF BURST: 539 ft

TYPE OF BURST AND PLACEMENT: Underground, in alluvium

VENTING:

None

### **REMARKS:**

No radiation levels were detected above background on or off the NTS from radioactivity released by this detonation. No radiation was detected at the worksite or any other location from releases of gaseous radioactivity during post-shot drilling.

Packrat

<u>DATE</u>: 6 Jun 1962 6 Jun 1962 T1ME: 0900 1700 SPONSOR: LASL

SITE: NTS - U3aw

37° 02' 44.5761" N 116° 02' 01.4312" W

DEPTH OF BURST: 860 ft

TYPE OF BURST AND PLACEMENT: Underground, in alluvium

VENTING:

Vented

### REMARKS:

Radiation levels were detected near SZ above normal background from radioactivity released by this detonation. No other radiation levels were detected on or off the NTS from radioactivity released by this detonation. Some radiation was detected in the area surrounding SZ from gaseous radioactivity released during post-shot drilling. No radioactivity was detected off the NTS from post-shot operations.

#### OPERATION NOUGAT - Des Moines

PST GMT

DATE: 13 Jun 1962 13 Jun 1962

TIME: 1300 2100

SPONSOR: LRL

THE RESERVE THE PROPERTY OF THE PARTY OF THE

SITE: NTS - U12j.01 37° 13' 20.00" N 116° 09' 43.78" W

SITE ELEVATION: 6301 ft MSL

DEPTH OF BURST: 660 ft

SLANT DEPTH: 610 ft

TYPE OF BURST AND PLACEMENT:
Tunnel, in weakly consolidated
tuff

#### VENTING:

Venting began at H+0.2 seconds on top of the hill at SZ, then from a vent hole at the face of the hill and finally through the portal. The duration of the release was approximately 5 minutes.

The estimated dose rate at Access Road normalized to H+1 hour, was 100 R/hr, and the estimated total release, normalized to H+1 minute, was 3x10 curies. The release products contained the following isotopes: I 131, I 133, I 135, Te 132, Ru 103, Ba-La 140, and Ru-Rh 105
Remote radiation measurements just inside the trailer shelter (see REMARKS) indicate about 100 R/hr at H+2.5 hours and 45 R/hr at H+6.5 hours.

The maximum reading a short distance from the portal at H+3 minutes was 30 R/hr.

#### REMARKS:

The shot vented out of the tunnel mouth with sufficient pressure and flow rate that radioactive debris was projected entirely across the canyon and deposited on the slope behind a trailer shelter. This shelter was not shielded from fallout. The entrance to the shelter faced away from the tunnel but the door was open.

#### Des Moines

OPERATION NOUGAT -

The shot caused  $I^{131}$  milk contamination in the following locations: Adavan, Nevada, 360 pc/ $\ell$  on 20 June; Elko, Nevada, 610 pc/ $\ell$  on 22 June; and Spokane, Washington, 1,240 pc/ $\ell$  on 20 June. All measurements were made from samples taken from fresh milk except those at Spokane which were made from pooled milk at a pasteurizing plant.

Figure 317 shows contours of residual gamma radiation in units of thousands of counts per second at 500 feet above the ground and are dashed where estimated. Pre-Des Moines background is assumed to be 1,000 counts per second. The aerial surveys were performed by ARMS-1 (USGS) on 27, 28, and 30 June 1962.

No radiation was detected at the worksite or any other location from releases of gaseous radioactivity during post-shot drilling and tunnel re-entry operations.

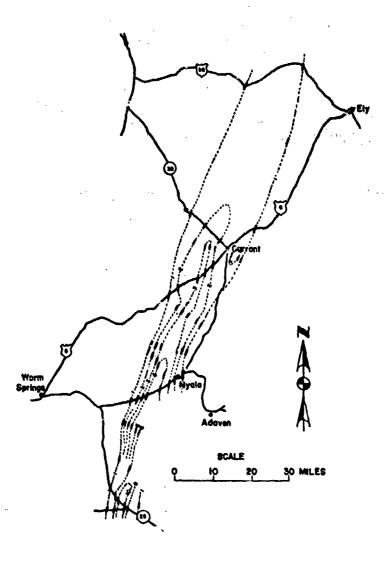




Figure 317 OPERATION NOUGAT - Des Moines contours of residual gamma radiation in thousands of counts per second at 500 feet above the g. und at H+14 days

TABLE 105 NEVADA WIND DATA FOR OPERATION NOUGAT -

DES MOINES

Altitude	H-hour (Note 1)	Note 1)
(MSL)	Direction	Speed
feet	degrees	mph
5,635	204	32.2
6,000	200	32.2
7,000	198	33.4
8,000	200	33.4
9,000	204	29.9
10,000	206	29.9
11,000	206	29.9
12,000	204	29.9
13,000	205	28.8
14,000	206	28.8
15,000	206	29.9

# Notes

- 1. Observations made at Yucca weather station.
- 2. Surface data (from RAOB) at level of GZ over Area 12, H-hour. Atmospheric pressure 819 millibars, temperature 20.3°C, relative humidity 12%.

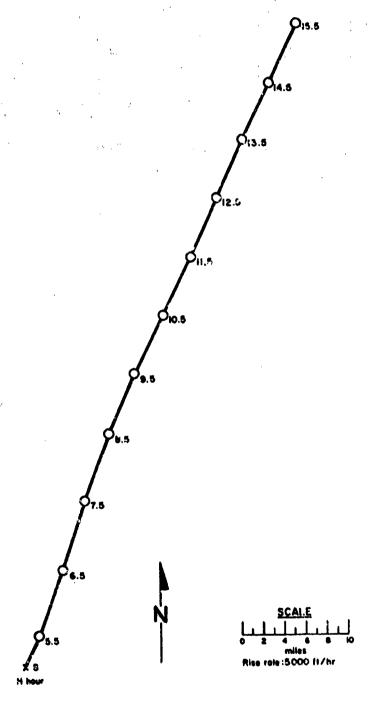


Figure 318. Hodograph for OPERATION NOUGAT -

Des Moines

Duman I

PST DATE: 21 Jun 1962 2 TIME: 0900 1

21 Jun 1962 1700 SPONSOR: LASL

SITE: NTS - U3be

37° 02' 35.0325" N 116° 01' 49.9090" W

DEPTH OF BURST: 854 ft

TYPE OF BURST AND PLACEMENT: Underground, in alluvium

**VENTING:** 

Vented

# **REMARKS:**

Rediation levels were detected near SZ above normal background from radioactivity released by this detonation. No other radiation levels were detected on or off the NTS from radioactivity released by this detonation. Some radiation was detected in the area surrounding SZ, from gaseous radioactivity released during post-shot drilling. No radioactivity was detected off the NTS from post-shot operations.

Haymaker

PST GMT SPONSOR: LASL 27 Jun 1962

<u>DATE</u>: 27 Jun 1962 27 Jun 1962 <u>TIME</u>: 1000 1800 <u>SITE</u>: NTS - U3aus

37° 02' 29.7466" N TOTAL YIELD: 56 kt 116° 02' 06.8826" W

DEPTH OF BURST: 1340 ft

CRATER DATA:

Subsidence crater

Diameter: 950 ft

Depth: 70 ft

TYPE OF BURST AND PLACEMENT:

Underground, in alluvium

#### VENTING:

Small visible quantities of radioactive steam and/or gas were released.

#### **REMARKS:**

Fractionation of debris made analysis of yield difficult.

Some radiation was detected on-site from radioactivity released by this detonation. The shot produced detectable I<sup>131</sup> contamination in milk. It produced levels of 180 pc/l in milk on 30 June at Austin, Nevada

Some radiation was detected in the area surrounding SZ from gaseous radioactivity released during post-shot drilling. No radioactivity was detected off the NTS from post-shot operations.

Marshmallow

PST GMT

DATE: 28 Jun 1962 28 Jun 1962

TIME: 0900 1700

SPONSOR: DOD

SITE: NTS - U16a

37° 00' 32.7636" N 116° 12' 03.7533" W

SITE ELEVATION: 6443 ft, MSL

DEPTH OF BURST: 1050 ft

VENTING: Vented SLANT DEPTH: 900 ft

TYPE OF BURST AND PLACEMENT: Tunnel, in semiwelded tuff

## REMARKS:

Radiation was detected on-site from radioactivity released by this detonation. No radiation levels above background were detected off the NTS in populated areas from radioactivity by this detonation. No radiation was detected at the worksite or any other location from releases of gaseous radioactivity during post-shot drilling and tunnel re-entry operations.

### Secremento

 DATE:
 30 Jun 1962
 30 Jun 1962

 TIME:
 1330
 2130

SPONSOR: LKL

SITE: NTS - U9v

37° 07' 02.6885" N 116° 02' 50.6975" W

SITE ELEVATION: 4178 ft MSL

PEPTH OF BURST: 500 ft

TYPE OF BURST AND PLACEMENT:
Underground, in slightly consolidated alluvium

## VENTING:

None

## REMARKS:

No radiation levels were detected above background on or off the NTS from radioactivity released by this detonation. No radiation was detected at the worksite or any other location from releases of gaseous radioactivity during post-shot drilling.

#### PROJECT SEDAN

PST GMT SPCNSOR: LRL

DATE: 6 Jul 1962 6 Jul 1962 TIME: 0900 1700 SITE: NTS - U10h

37° 10' 37.2249" N
TOTAL YIELD: 110 kt 116° 02' 43.3593" W

SITE ELEVATION: 4317 ft MSL

CRATER DATA: DEPTH OF BURST: 635 ft

Diameter: 1214 ±15 ft

Depth: 320 ft TYPE OF BURST AND PLACEMENT:
Underground, in alluvium

CLOUD TOP HEIGHT:

## STEMMING MATERIAL:

A 36-inch diameter cased drill hole backfilled with dry sand

#### **VENTING:**

A persistent cloud was produced containing appreciable quantities of radioactivity associated with particulates,

#### REMARKS:

The fallout was documented to a distance of approximately 140 statute miles downwind. The bulk of the data was taken in the period H+20 to H+28 hours and, since the decay was unknown, by referencing these data to H+24 hours using  $t^{-1} \cdot ^2$  decay, the error introduced is relatively small. The values thus obtained are considered reasonably reliable both on-site and off-site.

The significant contributors to the H+24-hour gamma dose rate were fission products,  $W^{187}$ , and  $Na^{24}$ . Approximately 42% of the gamma dose rate (H+24 hour) was due to fission products, 55% due to  $W^{187}$ , 2% due to  $Na^{24}$  and <1% due to  $W^{181}$ ,  $W^{188}$ ,  $Be^{7}$ ,  $Mn^{56}$  and tracers. It was assumed that there was no fractionation and that like fractions of components escaped from the crater.

Figs.319 & 320 present the gamma dose-rate contours at H+1 hour for the close-in and distant areas respectively. Dashed portions of contours indicate uncertainty. The patterns were reduced to show dose rate from fission products at H+1 hour, by multiplying the H+24-hour contour values by 0.42 and extrapolating those values to H+1 hour.

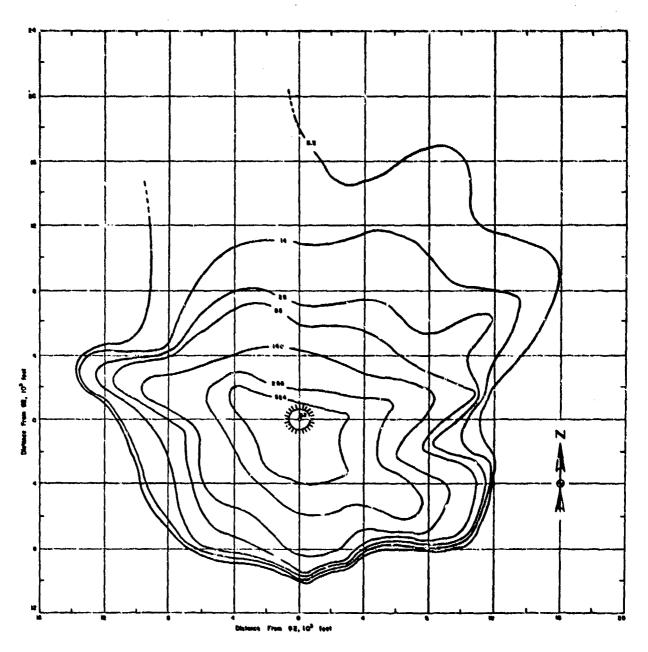


Figure 319 Project Sedan - Contours of residual gamma radiation (for fission products) in R/hr at H+l hour to 20,000 feet:

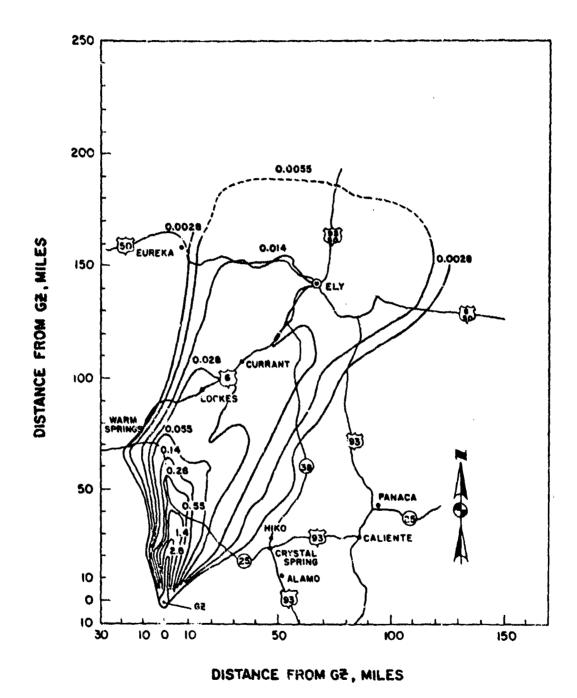


Figure 320. Project Sedan - Contours of residual gamma radiation (for fission products) in R/hr at H+1 hour to 140 miles downwind

TABLE 106 NEVADA WIND DATA AT BJY FOR PROJECT SEDAN

Altitude	H+13 minutes	minutes
(MSL)	Direction	Speed
feet	degrees	mph
Surface	160	11.5
5,000	150	11.5
6,000	170	10.4
7,000	200	10.4
8,000	210	12.7
9,000	220	15.0
10,000	210	18.4
11,000	200	23.0
12,000	200	30.0
13,000	190	26.5
14,000	190	19,6
15,000	190	15.0
16,000	, <b>180</b>	9.2
17,000	220	6.9
18,000	220	6.9
19,000	250	6.9

# Notes

1. Ubservation point: BJY, 4076 ft MSL; 4200 ft south of GZ.

# 2. Surface data for Area 10 at H+22 minutes:

Atmospheric pressure: 868 millibars

Temperature: 28.5°C

Dew point temperature: below instrumental threshold. Relative humidity: below instrumental threshold.

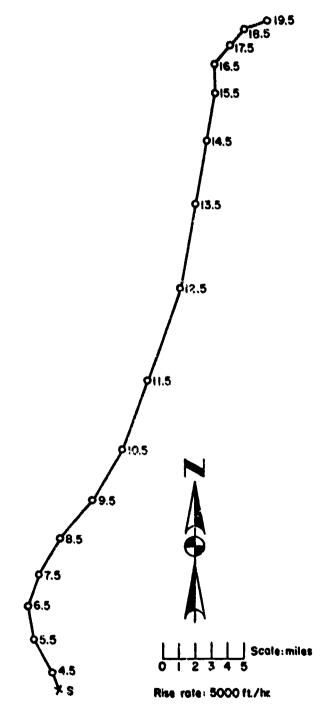


Figure 321. Hodograph for project Sedan

### OPERATION SUNBEAM - Little Feller II

PST DATE: 7 Jul 1962 7 Jul 1962

TIME: 1100 1900 SPONSOR: DOD

SITE: NTS - Area 18

37° 07' 09.1611" N 116° 18' 10.3321" W

SITE ELEVATION: 5129 ft MSL

HEIGHT OF BURST: 3 ft

TYPE OF BURST AND PLACEMENT:

Near-surface, over Nevada soil. Device supported by a cable

suspended between two posts.

## REMARKS:

CLOUD TOP HEIGHT:

11,000 ft MSL

The close-in and distant contours of residual radiation are shown in Figures 32? thru 324. All the contours are considered reliable. The contours in Figures 322 thru 324 were supplemented by data from REECo Rad-Safe Group and other projects.

The REECo D-Day and D+1 day data used were corrected to H+1 hour. Dashed portions of contours indicate uncertainty.

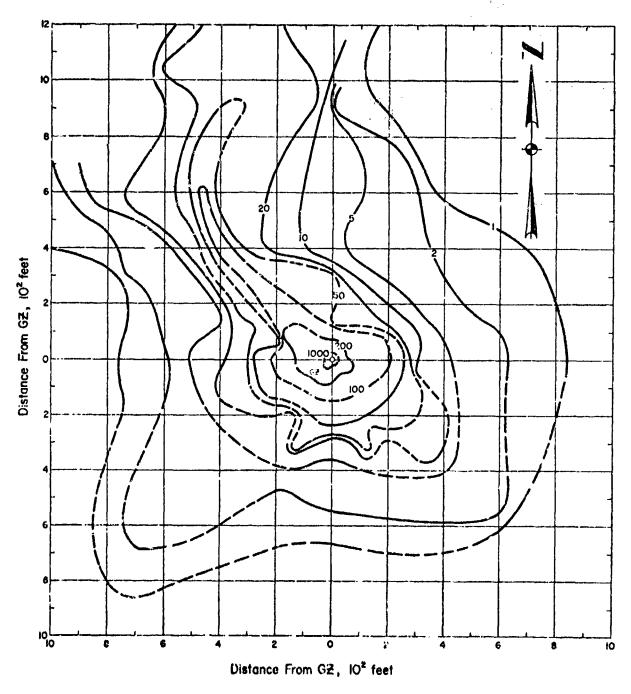


Figure 322, OPERATION SUNBLAM - Little Feller II contours of residual gamma radiation in N/hr at H+1 hour to 1,200 feet downwind

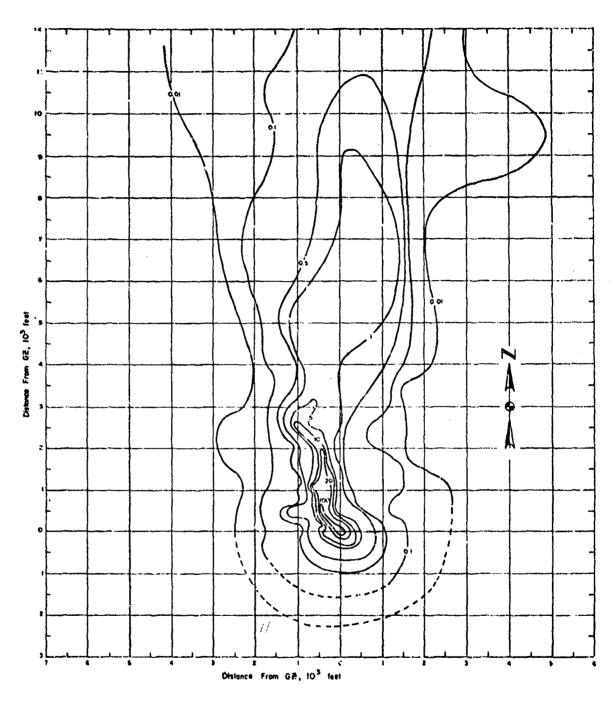


Figure 323. OPERATION SUNBEAM - Little Feller II contours of residual gamma radiation in R/hr at H+1 hour to 12,000 feet downwind

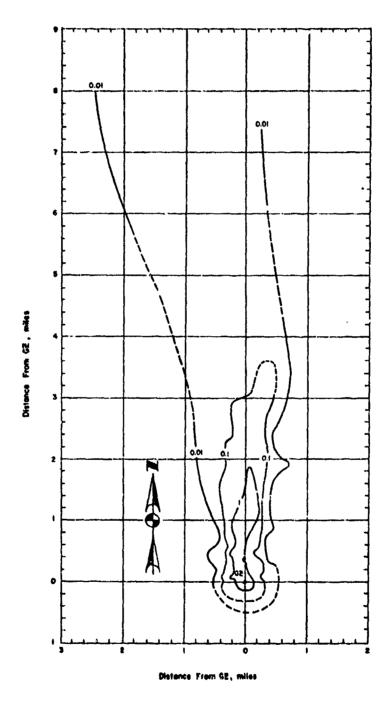


Figure 324. OPERATION SUNBEAM .. Little Feller II contours of residual gamma radiation in R/hr at H+1 hour to 8 miles downwind

LITTLE FELLER II

# TABLE 107 NEVADA WIND DATA FOR OPERATION SUNBEAM -

Altitude	H-h	our
(MSL)	Direction	Speed
feet	degrees	m <b>p</b> h
Surface	171	8.1
6,000	190	16.1
7,000	180	19.6
8,000	180	15.0
9,000	180	11.5
10,000	180	11.5
11,000	149	8.1
12,000	120	15.0
13,000	110	21.9
14,000	100	18.4
15,000	90	10.4
16,000	140	3.5
17,000	200	8.1
18,000	200	9.2

# Notes:

- 1. Observations made at forward control point, Area 18.
- 2. Air temperature at the surface was 35.5°C, and the relative humidity was too low to measure.

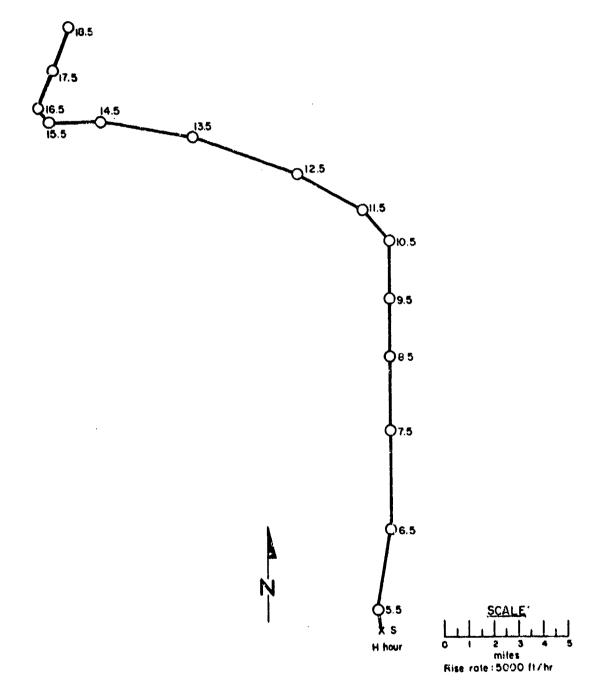


Figure 325. Hodograph for OPERATION SUNBEAM - Feller II.

Little

OPERATION SUNBEAM -

Johnie Boy

PST GMT 11 Jul 1962 DATE: 11 Jul 1962

1645

SPONSOR: DOD

TIME: 0845

SITE: NTS - Area 18 37° 07' 20.9852" N

TOTAL YIELD: 0.5 kt

116° 19' 58.9362" W

SITE ELEVATION: 5153 ft MSL

CRATER DATA:

Diameter: 122 ft 30.6 ft Depth:

DEPTH OF BURST: 23 inches

CLOUD TOP HEIGHT: 17,000 ft MSL

TYPE OF BURST AND PLACEMENT: Shallow underground, in

Nevada soil

CLOUD BOTTOM HEIGHT: 12,500 ft MSL

VERTING:

A persistent cloud was produced containing appreciable quantities of radioactivity associated with particulates

## REMARKS:

The close-in and distant contours of residual radiation are shown in Figures 326 & 327. Both contours are considered reliable. The close-in pattern of Figure 326 was supplemented by data from NRDL Project 2.9, NDL Project 2.20, and the REECo Rad-Safe unit. Decay corrections were made using the composite decay curve.

Figure 327 was supplemented in the distant portion by REECo Rad-Safe Group data taken on D-day and by the Public Health Service on D+1 day. Decay corrections in the distant regions were made using a decay exponent

Dashed portions of contours indicate uncertainty.

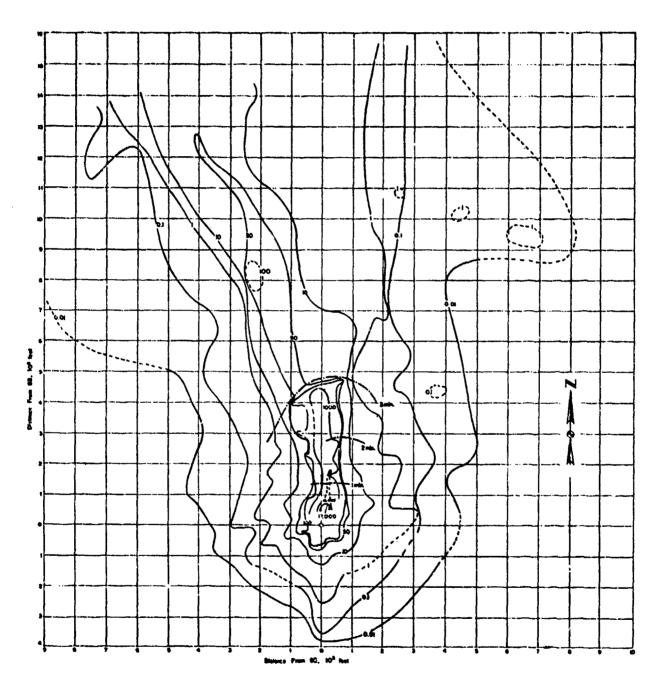


Figure 326. OPERATION SUNBEAMJohnie Boy contours of residual gamma radiation in R/hr at H+ 1 hour to 16,000 feet downwind, together with times of arrival based on experimental data

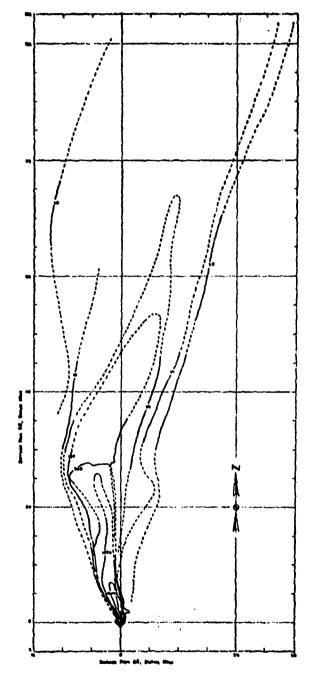


Figure 327. OPERATION SUNDEAM - Johnie Boy contours of residual gamma radiation in mR/hr at H+1 hour to 100 miles downwind

JOHNIE BOY

TABLE 108 NEVADA WIND DATA FOR OPERATION SUNBEAM -

Altitude	H-hour_		H+1 hour	
(MSL)	Direction	Speed	Direction	Speed
feet	degrees	mph	degrees	mph
Surface	195	8.1	210	17.3
6,000	<b>17</b> 0	8.1	210	11.5
7,000	160	8.1	170	10.4
8,000	160	12.7	150	12.7
9,000	160	18.4	170	12.7
10,000	170	17.3	190	11.5
11,000	180	13.8	200	11.5
12,000	180	17.3	200	17.3
13,000	190	20.0	200	25.3
14,000	200	24.2	200	25.3
15,000	200	25.3	210	29.9
16,000	200	25.3	210	29.9
17,000	200	31.1		
18,000	200	31.1		
19,000	210	29.9		
20,000	200	26.5		

# Notes:

- 1. Observations made at forward control point, Area 18.
- 2. Air temperature at the surface was 24.3°C and the relative humidity was 12%.

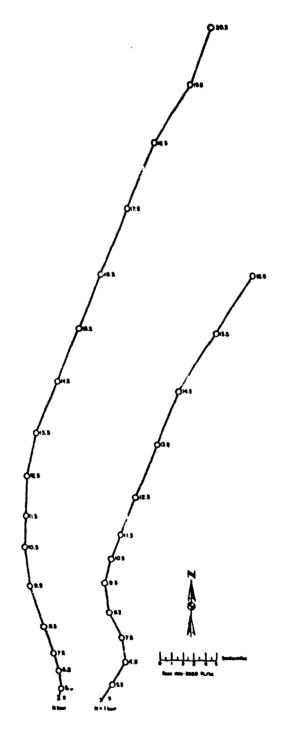


Figure 328. Hodograph for OPERATION SUNBEAM -

Johnie Boy

OPERATION STORAX -

Merrimac

PST GMT

DATE: 13 Jul 1962 13 Jul 1962

TIME: 0900 1600

SPONSOR: LRL

SITE: NTS - U3ba

37°03' 18.2331" N 116°02' 00.2205" W

SITE ELEVATION: 4040 ft MSL

DEPTH OF BURST: 1356 ft

TYPE OF BURST AND PLACEMENT: Underground, in slightly consolidated alluvium.

### VENTING:

This event released small visible quantities of radioactive steam and/or gases.

### REMARKS:

Radiation was detected on-site from radioactivity released by this detonation. No radiation levels above background were detected off the NTS in populated areas from radioactivity released by this detonation.

Some radiation was detected in the area surrounding SZ, from gaseous radioactivity released during post-shot drilling. No radioactivity was detected off the NTS from post-shot operations.

OPERATION SUNBEAM -

Small Boy

PST GM:

DATE: 14 Jul 1962 14 Jul 1962
TIME: 1030 1830

SPONSOR: DOD

1830 SITE: NTS - Area 5

36" 48' 08.9942" N 115" 55' 89.2031" W

SITE ELEVATION: 3078 ft MSL

HEIGHT OF BURST:

TYPE OF BURST AND PLACEMENT:

CLOUD TOP HEIGHT: 19,000 ft MSL

Tower, over Nevada soil

## **REMARKS:**

The close-in and distant contours of residual radiation are shown in Figures 329 thru 332

The estimated Small Boy GZ contours of Figure 329 are based on data taken from D-day to D+3 days by NDL, NRDL, and REECo. The composite decay curve of NDL Project 2.8 was used to correct the data to H+1 hour. The close-in contours of Figure 330 are revisions of those

2.11 included and supplemented by data from the REECo Rad Safe Group and NDL Project 2.9.

The two off-site contour patterns are shown in Figure 331 (out to 29 miles) and Figure 332 (out to 300 miles). The middle portion of Figure 331 (around 15 miles downwind) was constructed using data from NDL, UCLA, NRDL, and the PHS. The portion farthest downwind was constructed from data obtained by NDL and UCLA. The contours were corrected to H+1 hour using a decay constant of 1.27. Figure 332 is based almost entirely on ground monitor surveys conducted by NDL, UCLA, and the PHS, supplemented by aerial surveys by CETO Project 62.80. The data were extrapolated back to H+1 hour by t<sup>-1</sup>·<sup>2</sup>. The fallout started arriving at 250 to 400 miles downwind sometime in the latter part of D+1 day reaching a peak at D+2 days. Figure 333 shows the probable path of the Small Boy cloud as determined by exposure rate measurements as far as western Nebraska.

In all the figures the dashed portions indicate uncertainty.

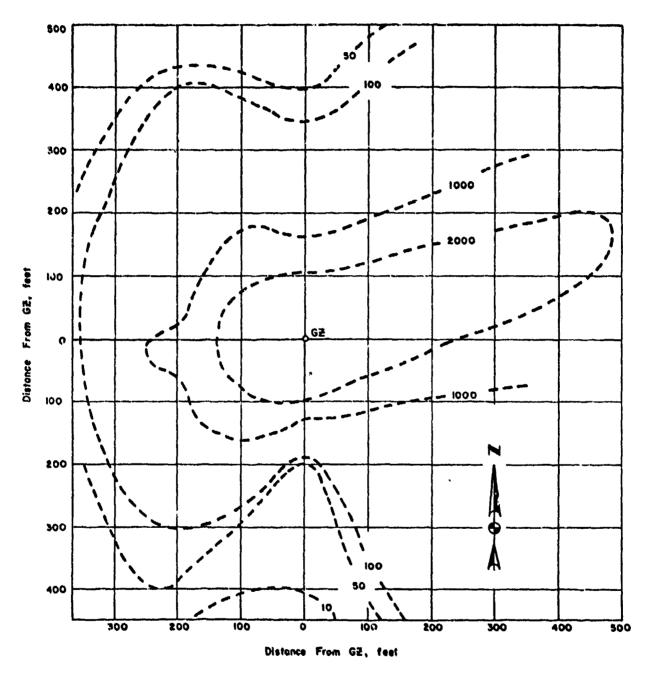
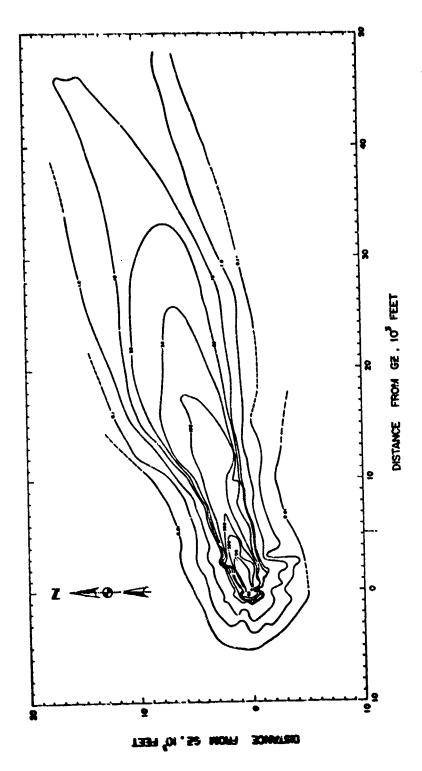


Figure 329. OPERATION SUNBEAM - Small Boy GZ area contours in R/hr at H+1 hour



Pigure 330.OPERATION SUNBEAM - Small Boy contours of residual gamma radiation in R/hr at H+1 bour to 50,000 feet downwind

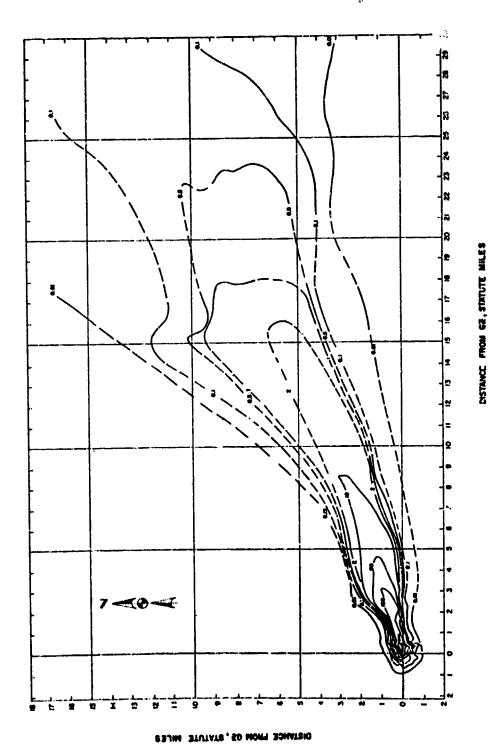


Figure 331 OPERATION SUNBEAM - Small Boy contours of residual gamma radiation in R/hr at H+1 hour to 29 miles downwind

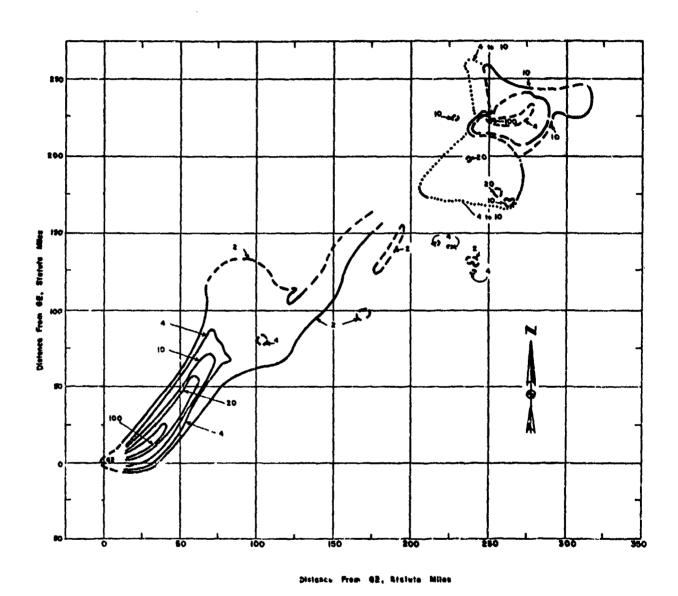


Figure 332. OPERATION SUNBEAM - Small Boy contours of residual gamma radiation in R/hr at H+l hour to 300 miles downwind

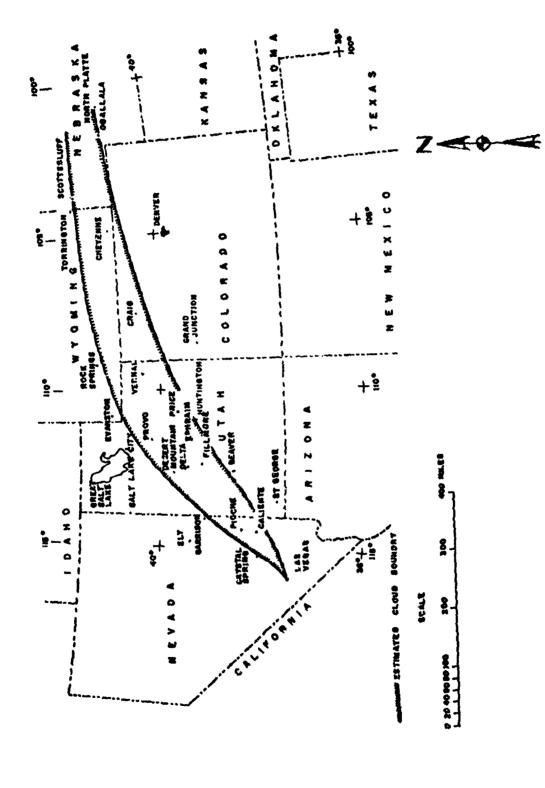


Figure 333, OPERATION SUNBEAM - Sa

Small Boy cloud path

TABLE 109 NEVADA WIND DATA FOR OPERATION SUNBEAM -

SMALL BOY

Altitude	H+5 Min	utes	H+1/4 H	our	H+70 M11	nutes
(MSL)	Direction	Speed	Direction	Speed	Direction	Speed
feet	degrees	mph	degrees	mph	degrees	mph
3,078	135	2.3	120	12.3	180	6.9
4,000	300	1.2	145	4.6	185	6.9
5,000	310	1.2	170	5.8	188	8.1
6,000	330	2.3	180	6.9	212	9.2
7,000	280	2.3	170	6.9	224	11.5
8,000	250	6.9	180	3.5	237	11.5
9,000	240	13.8	230	5.8	245	12.7
10,000	240	18.4	240	12.7	240	15.0
12,000	240	9.2	235	10.4	225	9.2
14,000	240	9.2	230	9.2	280	8.1
15,000	_	-	-	_	265	4.6
16,000	240	9.2	230	8.1		
18,000	280	16.1	260	15.0		
20,000	280	28.8	280	26.5		

# Notes:

- 1. Observations made at Frenchman's Flat.
- 2. Air temperature at the surface was 31.7°C; the relative humidity was 16%.

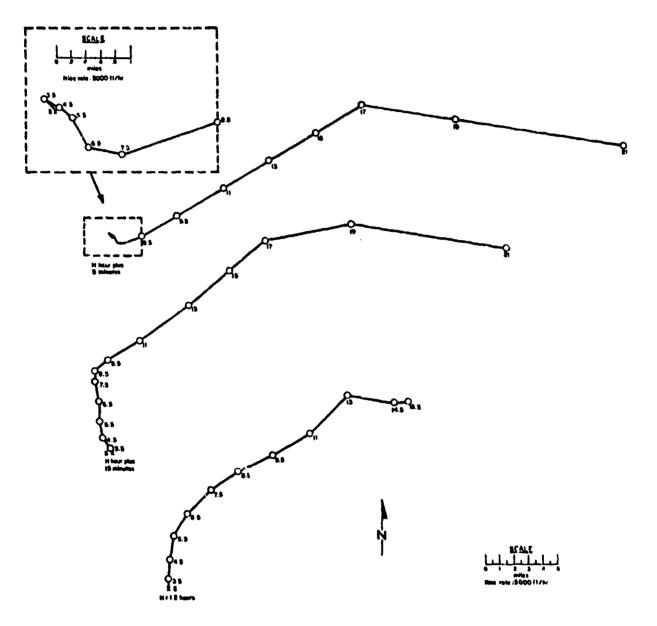


Figure 334. Hodograph for OPERATION SUNBEAM -

Small Boy.

### OPERATION SUNBEAM - Little Feller I

PST GMT

DATE: 17 Jul 1962 17 Jul 1962 TIME: 0900 1700

CLOUD TOP HEIGHT: 11,000 ft MSL

SPONSOR: DOD

SITE: NTS - Area 18

37° 06' 30.7784" N 116° 19' 02.1775" W

SITE ELEVATION: 5194 ft MSL

HEIGHT OF BURST:

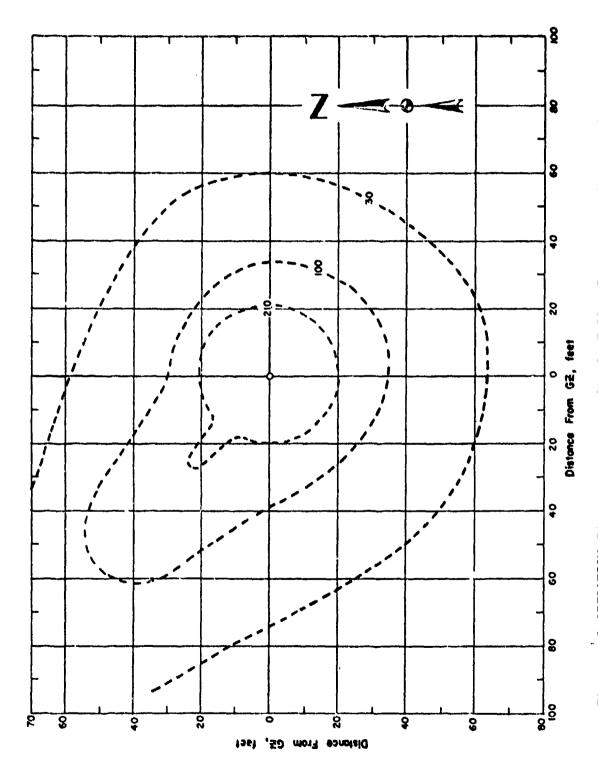
TYPE OF BURST AND PLACEMENT:

Near surface, over Nevada soil. Warhead fired from Davy

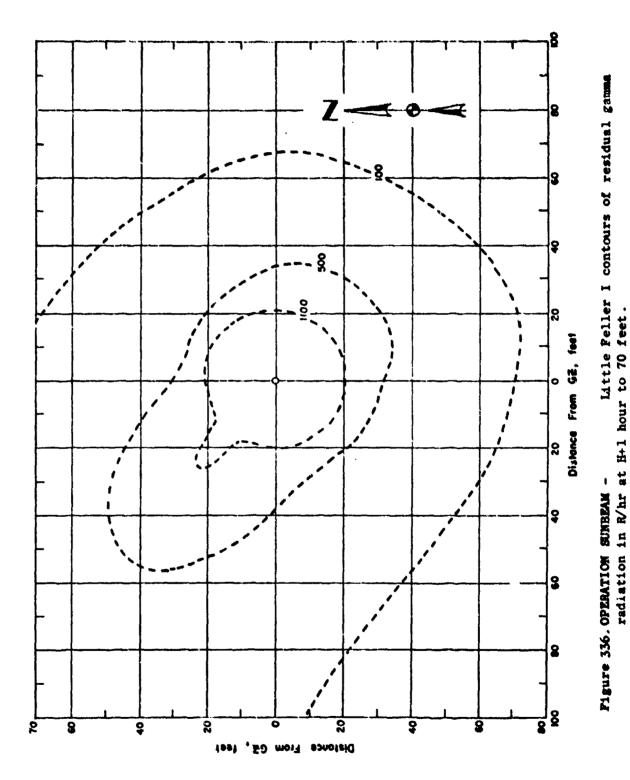
Crockett weapon system.

## REMARKS:

The close-in and distant contours of residual radiation are shown in Figures 335 thru 338. The very close-in contours are shown in Figure 335 Figure 337 shows contours of residual gamma radiation at H+4 hours to 12,000 feet downwind. The earliest readings were not taken until approximately H+4 hours because troop exercises were executed in the area of interest at earlier times. The application of an average decay exponent to the overall pattern or representative portions of the pattern did not appear to be justified; therefore the H+1+-hour patterns are presented as the basic patterns and are considered reliable. The H+4-hour patterns were constructed from data obtained by NDL, REECo Rad Safe Group remote units, and PHS off-site surveys. Figures 336 and 338 are the result of arbitrarily applying a decay exponent of 1.2 to produce H+1-hour patterns. These patterns are given only to represent the order of magnitude of the H+l-hour dose rates and are considered to be much less reliable than the ones representing H+4 hours.



Little Feller I contours of residual gamma Figure 335. OFERATION SUNBEAM - Little Feller 1 Contours radiation in R/hr at H+4 hours to 70 feet downwind.



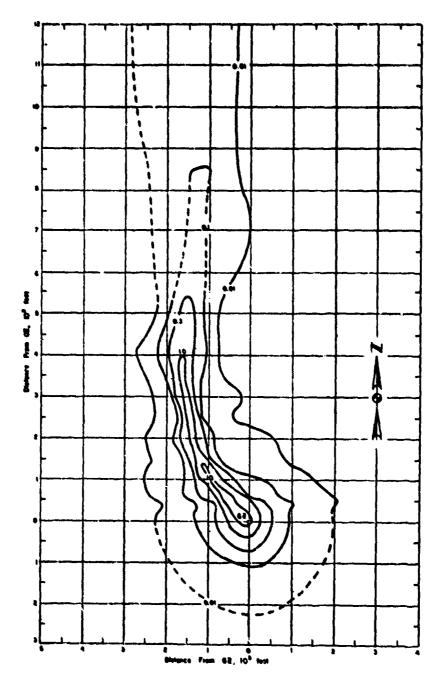


Figure 337. OPERATION SUNBEAM - Little Feller I contours of residual gamma radiation in R/hr at R+4 hours to 12,000 feet downwind.

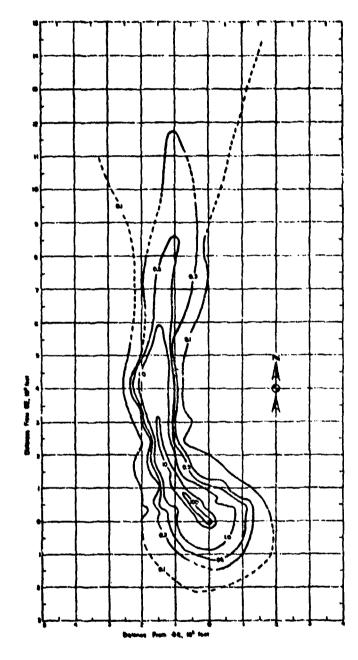


Figure 338.OPERATION SUNBEAM - Little Feller I contours of residual gamma radiation in R/hr at H+1 hour to 12,000 feet downwind.

Altitude	H-House	ır
(MSL)	Direction	Speed
feet	degrees	mph
Surface	200	17.3
6,000	200	15.0
7,000	190	13.8
8,000	170	13.8
9,000	170	12.7
10,000	150	12.7
11,000	140	12.7
12,000	150	15.0
13,000	180	17.3
14,000	180	23.0
15,000	180	26.5
16,000	190	28.8

# Notes:

- 1. Observations made at forward control point, Area 18.
- 2. Air temperature at the surface was 29.7°C and the relative humidity was 17 percent.

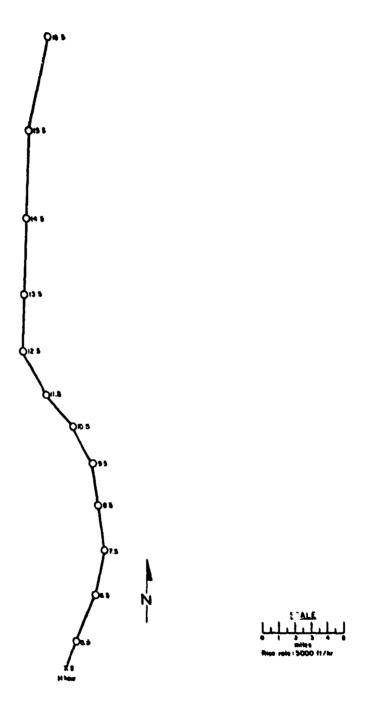


Figure 339. Hodograph for OPERATION SUNBEAM - Feller I.

Little

Wichita

PST GMT

DATE: 27 Jul 1962 27 Jul 1962

TIME: 1300 2100

SPONSOR: LRL

SITE: NTS - U9y

37° 07' 46.9592" N 116° 03' 23.3114" W

SITE ELEVATION: 4238 ft MSL

DEPTH OF BURST: 493 ft

TYPE OF BURST AND PLACEMENT: Underground, in slightly consolidated alluvium.

### **VENTING:**

Low-velocity venting was observed at H+0.5 second with an initial height of 200-500 feet. AT H+26 seconds, gas vented from a fissure in the earth approximately 50 feet north of the emplacement hole and continued for 5 minutes. The estimated dose rate at 500 feet from GZ, normalized to H+1 hour was > 10 R/hr, and the estimated total release normalized to H+1 minute was  $2 \times 10^6$  curies. The only isotope identified in the release products was  $1^{131}$ 

### **REMARKS:**

Radiation was detected on-site from radioactivity released by this detonation. No radiation levels above background were detected off the NTS in populated areas from radioactivity released by this detonation. No radiation was detected at the worksite or any other location from releases of gaseous radioactivity during post shot drilling

York

PST DATE: 24 Aug 1962 GMT L Aug 1962

TME: 0700

2h Aug 1962 1500 SPONSOR: LRL

SITE: NTS-U9z

37° C7' 07.085" N 116° 02' 22.145" W

SITE ELEVATION: 4208 ft MSL

DEPTH OF BURST: 747 ft

TYPE OF BURST AND FLACEMENT:
Underground, in alluvium

### VENTING:

None, except during post-shot drilling

### REMARKS:

No radiation levels were detected above background on or off the NTS from radioactivity released by this detonation. Some radiation was detected in the area surrounding SZ from gaseous radioactivity released during post-shot drilling. No radioactivity was detected off the NTS from post-shot operations

Bobac

GMT

24 Aug 1962 24 Aug 1962

DATE: TIME:

0900

1700

SPONSOR: LASL

SITE: NTS - U3bl

37° 02' 46.112" N 116° 01' 25.818" W

DEPTH OF BURST: 674 ft

TYPE OF BURST AND PLACEMENT: Underground, in alluvium

## **VENTING:**

None, except during post-shot drilling

### REMARKS:

No radiation levels were detected above background on or off the NTS from radioactivity released by this detonation. Some radiation was detected in the area surrounding SZ from gaseous radioactivity released during post-shot drilling. No radioactivity was detected off the NTS from post-shot drilling. No radioactivity was detected off the NTS from post-shot operations

Hyrax

GMT PST 14 Sep 1962 1700

SPONSOR: LASL

DATE: 14 Sep 1962 TIME: 0900

SITE: NTS - U3bh

37° 02' 38.1654" N 116° 01' 16.0105" W

DEPTH OF BURST: 709 ft

TYPE OF BURST AND PLACEMENT: Underground, in alluvium

**VENTING:** Vented

### REMARKS:

Radiation levels were detected near SZ above normal background from radioactivity released by this detonation. No other radiation levels were detected on or off the NTS, from radioactivity released by this detonation. Some radiation was detected in the area surrounding S2 from gaseous radioactivity released during post-shot drilling. No radioactivity was detected off the NTS from post-shot operation

Peba

GMT

1700

SPONSOR: LASL

DATE: 20 Sep 1962 TIME: 0900

20 Sep 1962

SITE: NTS - U3bb

37° 03' 18.1538" N 116° 01' 45.4169" W

DEPTH OF BURST: 792 ft

TYPE OF BURST AND PLACEMENT: Underground, in alluvium

VENTING:

No venting

OPERATION STORAX -

Allegheny

GMT

SPONSOR: LRL

TIME: 0900

DATE: 29 Sep 1962 29 Sep 1962

1700

SITE: NTS - U9x

37° 07' 00.0368" N

116° 01' 57.9995" W

SITE ELEVEATION: 4258 ft MSL

DEPTH OF BURST: 692 ft

TYPE OF BURST AND PLACEMENT:

Underground, in semiwelded tuff

### **VENTING:**

This event released small "isible quantities of radioactive steam and/or gases

### REMARKS:

Radiation was detected on-site from radioactivity released by this detonation. No radiation levels above background were detected off the NTS in populated areas from radioactivity released by this detonation. No radiation was detected at the worksite or any other location from releases of guseous radioactivity during post-shot drilling

Mississippi

SPONSOR: LRL

tuff

PST GMT

DATE: 5 Oct 1962 5 Oct 1962 TIME: 0>00 1700

SITE: NTS - U9ad 37° 08' 21.8516" N 116° 03' 01.1677" W TOTAL YIELD: 110 kt

SITE ELEVATION: 4234 ft MSL

CRATER DATA:

DEPTH OF BURST: 1622 ft Subsidence crater

Diameter: 900 ft TYPE OF BURST AND PLACEMENT: Depth: 160 ft Underground, in semiwelded

**VENTING:** 

None, except during post-shot drilling

## REMARKS:

No radiation levels were detected above background on or off the NTS from radioactivity released by this detonation. Some radiation was detected in the area surrounding SZ, from gaseous radioactivity released during post-shot drilling. No radioactivity was detected off the NTS from post-shot operations

Roanoke

PST **GMT** 12 Oct 1962 12 Oct 1962 SPONSOR: LRL

DATE: 0700 TIME: 1500

SITE: NTS - U9q

37° 07' 21.8364" N 116° 03' 02.8917" W

SITE ELEVATION: 4198 ft MSL

DEPTH OF BURST: 514 ft

TYPE OF BURST AND PLACEMENT: Underground, in alluvium

### VENTING:

Gas-venting and minor gaseous release occurred at H+7 minutes at SZ through the emplacement hole casing and air dielectric signal and diagnostic cables, and lasted for 128 minutes. The estimated dose rate at 1000 feet from SZ, normalized to H+1 hour, was 22 mR/hr and the estimated total release, normalized to N+1 minute, was 5x104 curies. The identification of isotopes is not available. The maximum radiation reading outside the crater area was 25 mR/hr at 1000 fect north of SZ at H+2 hours. The greater part of the radiation was confined to the vicinity of SZ. The venting was stopped by preparations for post-shot drilling

### REMARKS:

No other radiation levels were detected on or off the NTS from radioactivity released by this detonation. Some radiation was detected in the area surrounding SZ from gaseous radioactivity released during post-shot drilling. No radioactivity was detected off the NTS from post-shot operations

Bandicoot

PST GMT

DATE: 19 Oct 1962 19 Oct 1962

TIME: 1000 1800

SPONSOR: LASL

SITE: NTS - U3bj

37° 02' 22.3431" N 116° 01' 16.1267" W

SITE ELEVATION: 4009 ft MSL

DEPTH OF BURST: 792 ft

DEPTH OF EMPLACEMENT HOLE: 800 ft

TYPE OF BURST AND PLACEMENT: Underground, in alluvium

CLOUD TOP HEIGHT: 10,500 ft MSL

### VENTING:

Immediately following the event a persistent cloud was produced containing appreciable quantities of radioactivity associated with particulates

The intensity of the H-hour release activity was > 7500 R/hr. This value was reduced in 5 hours to a minimum of 150 R/hr. The cloud diffused to the north and south and deposited a maximum dose rate of 20 mR/hr at 1410 hours at Area 16 and was reduced to 9 mR/hr at 1445 hours. The Camp Mercury maximum dose rate was 5.75 mR/hr at 1335 hours and was reduced to 1.5 mR/hr at 1450 hours.

Bandicoot

### REMARKS:

The radioactive cloud split into two portions. The lower portion of the cloud traveled in a NNE direction to Arca 9 where it remained stagmant, then went slowly across Flat Top Mesa and north to the Area 12 compound

The cloud dispersed in the valleys north of the test site and no exposures to people were detected

The upper portion of the cloud traveled in a southern direction and traversed a course over the CP Compound, Camp Mercury, Cactus Springs, Indian Springs, Lathrop Wells and Highway 95 cloud was first detected over Highway 95 at H+2 hours Upon crossing Highway 95, the cloud was 9 miles wide, was diffusing rapidly, and was proceeding SW. The intensity at ground level was approximately twice background. A maximum intensity of 50 mR/hr was detected at 4 miles west of the Mercury junction on Highway 95 20-mR/hr dose rate was recorded 7 miles west of the Mercury junction at H+3.5 hours Maximum intensities by portable instruments (3 feet aboveground) were recorded for Johnie, 12 mR/hr; Ash Meadows, 16 mR/hr; Death Valley Junction, 3 mR/hr and Camp Mercury, 5 mR/hr. No radiation was detected off-site at Area 51, Indian Springs and Pahrump The highest reading at ground level at Cactus Springs (36 miles from SZ) was approximately 0.6 mR/hr

Figure 340 shows contours of residual gamma activity in mR/hr for a midtime of H+24 hours. The contours were constructed from Rad Safe Group survey performed by the REECo

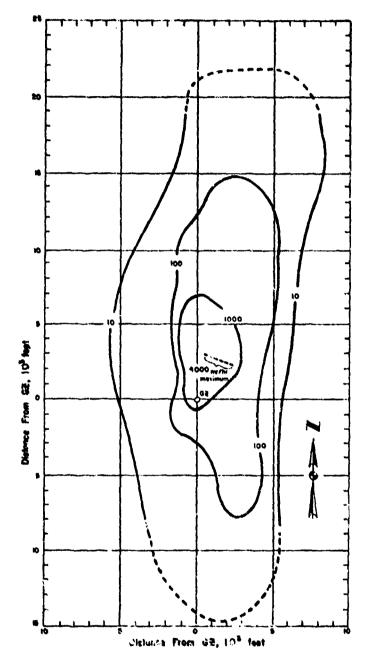


Figure 340. OPERATION STORAX - Bandicoot contours of residual frame radiation in mR/hr at a midtime of H+24 hours to 22,000 feet downwind.

Altitude	H-hour	(Note 1)
(MSL)	Direction	Speed
feet	degrees	mph
4,010	calm	calm
5,000	191	2.3
6,000	305	4.6
7,000	353	12.7
8,000	10	17.3
9,000	9	20.7
10,000	14	26.5
11,000	23	29.9
12,000	27	23.0
13,000	27	38.0
14,000	22	39.1
15,000	24	39.1

# Notes:

- 1. Observations made at Yucca weather station.
- Surface data (from RAOB) at level of GZ over Area 3, H-hour: Atmospheric pressure 878 millibars, temperature 13.0°C, dew point temperature 3.8°C, relative humidity 54%.

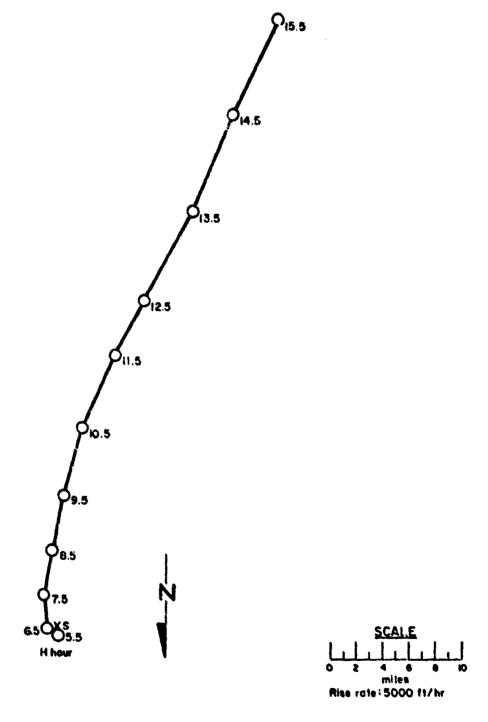


Figure 341. Hodograph for OPERATION STORAX -

Bandicoot

Santce

PST GMT

DATE: 27 Oct 1962 27 Oct 1962
TIME: 0700 1500

SPONSOR: LRL

SITE: NTS - U10f

37° 08' 57.5068" N 116° 03' 12.6102" W

SITE ELEVATION: 4254 ft MSL

DEPTH OF BURST: 1048 ft

TYPE OF BURST AND PLACEMENT: Underground, in alluvium

VENTING:

None, except during post-shot drilling

### **REMARKS:**

No radiation levels were detected above background on or off the NTS from radioactivity released by this detonation. Some radiation was detected in the area surrounding SZ from gaseous radioactivity released during post-shot drilling. No radioactivity was detected off the NTS from post-shot operations

Anacostia

PST GMT

DATE: 27 Nov 1962 27 Nov 1962

TIME: 1000 1800

SPONSOR: LRL

SITE: NTS - U91

37° 07' 22.1140" N 116° 01' 44.4795" W

SITE ELEVATION: 4268 ft MSL

DEPTH OF BURST: 747 ft

TYPE OF BURST AND PLACEMENT:
Underground, in semiwelded tuff

### VENTING:

Venting occurred at H+8 seconds at the radiochemistry sampling area and at H+35 seconds between the emplacement pipe and the prompt sampling pipe. The release endured for 23.7 minutes

The estimated dose rate at SZ normalized to H+1 hour, was 8.1 R/hr and the estimated total release, normalized to H+1 minute, was  $5x10^5$  curies. The isotope identities are not available.

## REMARKS:

The effluent gas gave a maximum reading of 95 mR/hr on the ground one mile downwind from SZ at H+0.5 hour. The most significant radiation was confined to the crater and radiochemistry sampling area

Tendrac

 DATE:
 7 Dec 1962
 7 Dec 1962

 TIME:
 1100
 1900

SPONSOR: LASL/UK

SITE: NTS - U3ba 37° 06' 06.2914" N 116° 01' 45.5161" W

SITE ELEVATION: 4033 ft MSL

DEPTH OF BURST: 1001 ft

TYPE OF BURST PLACEMENT:
Underground, in alluvium

VENTING: None

Madison

PST GMT DATE: 12 Dec 1962

SPONSOR: LRL

12 Dec 1962 TIME: 0925 1725

SITE: NTS - U12 G.O1 37° 10' 07.23" N 116° 12' 21.87" W

SITE ELEVATION: 7477 ft MSL

DEPTH OF BURST: 1317 ft

VENTING: Vented SLANT DEPTH: 1160 ft

TYPE OF BURST AND PLACEMENT: Tunnel, in semiwelded tuff

### REMARKS:

Radiation levels were detected near SZ above normal background from radioactivity released by this detonation. No other radiation levels were detected on or off the NTS from radioactivity released by this detonation. Some radiation was detected in the area surrounding SZ from gaseous radioactivity released during post-shot drilling or tunnel re-entry operations. No radioactivity was detected off the NTS from postshot operations

Numbat

PST GMT

DATE: 12 Dec 1962 12 Dec 1962

TIME: 1045 1845

SPONSOR: LASL

SITE: NTS - U3bu

37° 02' 49.9726" N 116° 00' 56.1881" W

SITE ELEVATION: 4030 ft MSL

DEPTH OF BURST: 761 ft

TYPE OF BURST AND PLACEMENT: Underground, in alluvium

VENTING:

## REMARKS:

Radiation levels were detected near SZ above normal background from radioactivity released by this detonation. No other radiation levels were detected on or off the NTS. Some radiation was detected in the area surrounding SZ from gaseous radioactivity released during post-shot drilling. No radioactivity was detected off the NTS from post-shot operations

### APPENDIX A

Announced United States Nuclear Detonations

Yields are listed as: Low (less than 20 kt)
Intermediate (20 to 999 kt inclusive)
Low Megaton (one to several megatons).

Prior to October 1958, testing was conducted on an intermittent basis and each series of tests was designated by a series name, such as OPERATION CROSSROADS. The United States conducted no tests from October 30, 1958 to September 1961. After resumption of testing, tests were conducted year around and were listed by fiscal year. For example, all NTS tests during FY-1962, which ended June 30, 1962, were in the OPERATION NOUGAT series except for four surface tests (Little Feller I and II, Small Boy and Johnny Boy) designated DOMINIC II, which were a continuation of the DOMINIC I series conducted in the Pacific.

NORIO DAR II   19475458   JAPAN   180000   180000   13 KT   13 KT   15 KT	EVENT MAME TRINITY	DATE (GCT) 87/16/45	LOCATION ALANGGORDO	TYPE TONER	PURPOSE WEAPONS RELATED	YIELD RANGE 19kt
SECOMO CONDAT         VAZE-NASARIA         JAPAN         AIROROP         CONDAT           SECOMO CONDAT         VISC-NAGS NATION CROSSROADS         AIROROP         NEGAPONS         RELATED           8-7/24/46         BIXINI         UN         NEGAPONS         RELATED           8-4/34/46         BIXINI         TONER         NEGAPONS         RELATED           8-4/34/46         ENIMETOR         TONER         NEGAPONS         RELATED           8-1/24/46         ENIMETOR         TONER         NEGAPONS         RELATED           8-1/24/46         ENIMETOR         TONER         NEGAPONS         RELATED           8-1/24/46         ENIMETOR         TONER         NEGAPONS         RELATED           8-1/24/51         NTS         AIROROP         NEGAPONS         RELATED           8-1/24/52         NTS         AIROROP         NEGAPONS         RELATED           8-1/24/51         ENIMETOR         TONER         NEGAPONS         RELATED	D WAR II FIRST COMBAT U	AN A-BONS 88/85/45 SE-HIROSHIMA	JAPAN	AIROROP	COMBAT	13 KT
17,24,46   BIKINI	O MAR II Second Combat	VA/89/45 USE-M/GASAKI	JAPAN OPERATION CROSSROADS	AIRDROP	COMBAT	
14,14,46   BIKINI	44	94/15/24	BIKINI	AIRDROP	WEAPONS RELATED	23 KT
04/14/46   EMINETOK   TOWER   WEAFONS RELATED OPERATION RANGER   TOWER   WEAFONS RELATED OPERATION GREENHOUSE   WEAFONS RELATED OPERATION GREENHOUSE   TOWER   WEAFONS RELATED OPERATION BUSTER JOWER   WEAFONS RELATED OPERATION BUSTER JOWER	<b>*</b>	91/54/48	BIKINI OPERATION SANDSTONE	25		23 KT
05/14/46   ENIMETOR   TOMER   WEAPONS RELATED	<b>*</b>	14/11/41	ENIWETOK	TOWER	WEAFONS PFLATED	37KT
10   10   10   10   10   10   10   10	lu	84/38/48	ENIMETOK	TOWER		4967
1,27/51   NTS   ATRONOP   NEAPONS RELATED	4	85/14/48	ENIMETOK OPERATION RANGER	TOWER	NEAPONS RELATED	18KT
1,720,51   NTS   AIROROP   NEAPONS RELATED	h.i	15/22/10	HTS	AIROROP	WEAPONS RELATED	1111
10   10   10   10   10   10   10   10	æ	81/20/51	NTS	AIRDROP		6KT
-2 82/06/51 NTS AIROROP WEAPONS RELATED  92/06/51 NTS OPERATION GREENHOUSE  04/87/51 ENIMETOK TOWER WEAPONS RELATED  95/24/51 ENIMETOK TOWER WEAPONS RELATED  95/24/51 ENIMETOK TOWER WEAPONS RELATED  95/24/51 ENIMETOK TOWER WEAPONS RELATED  10/22/51 NTS TOWER WEAPONS RELATED  10/22/51 NTS AIROROP WEAFONS RELATED  11/08/51 NTS AIROROP WEAFONS RELATED  11/19/51 NTS AIROROP WEAFONS RELATED  11/108/51 NTS AIROROP WEAFONS RELATED  11/108/51 NTS AIROROP WEAFONS RELATED		15/11/21	NTS	AIRDROP	WEAPONS RELATED	111
B2/06/51   NTS   AIROROP   NEAPONS RELATED	IA-2	15/20/20	NTS	AIRDROP	WEAFONS RELATED	BKT
E         84/28/51         ENIMETOK         TOWER         WEAPONS RELATED           B 4/28/51         ENIMETOK         TOWER         WEAPONS RELATED           B 5/24/51         ENIMETOK         TOWER         WEAPONS RELATED           10/22/51         NTS         TOWER         WEAPONS RELATED           10/22/51         NTS         AIRDROP         WEAPONS RELATED           11/15/51         NTS         AIRDROP         WEAPONS RELATED           11/16/51         NTS         AIRDROP         WEAPONS RELATED           11/19/51         NTS         AIRDROP         WEAPONS RELATED           11/19/51         NTS         AIRDROP         WEAPONS RELATED           11/19/51         NTS         AIRDROP         WEAPONS RELATED		15/06/51	_	AIRDROP		22KT
E 95/24/51 ENIMETOK TOWER WEAFONS RELATED  85/24/51 ENIMETOK TOWER WEAFONS RELATED  16/22/51 NTS TOWER WEAFONS RELATED  16/22/51 NTS TOWER WEAFONS RELATED  11/21/51 NTS AIRDROP WEAFONS RELATED  11/25/51 NTS AIRDROP WEAFONS RELATED		15/20/10	ENINETOK	TOWER	WEAPONS RELATED	
E 95/80/51 ENIMETOR TOWER MEAPONS RELATED  95/24/51 ENIMETOR TOWER WEAPONS RELATED  16/22/51 NTS TOWER WEAPONS RELATED  10/28/51 NTS AIRDROP WEAFONS RELATED  11/1/51 NTS AIRDROP WEAFONS RELATED		84/28/51	ENTHETOK	TOWER		47KT
85/24/51         ENIWETOK         TOWER         WEAPONS RELATED           16/22/51         NTS         TOWER         WEAPONS RELATED           10/20/51         NTS         AIRDROP         WEAPONS RELATED           11/21/51         NTS         AIRDROP         WEAPONS RELATED           11/25/51         NTS         AIRDROP         WEAPONS RELATED           11/25/51         NTS         AIRDROP         WEAPONS RELATED           11/25/51         NTS         AIRDROP         WEAPONS RELATED	166	15/99/58	ENIWETOK	TOWER	WEAPONS RELATED	
10/22/51         NTS         TONER         NEAPONS RELATED           10/20/51         NTS         AIRDROP         NEAFONS RELATED           11/21/51         NTS         AIRDROP         NEAFONS RELATED           11/20/51         NTS         AIRDROP         NEAFONS RELATED           11/19/51         NTS         AIRDROP         NEAFONS RELATED	•	18/5754	ENTWETOK OPERATION BUSTER-JANGLE	TOWER		
10/28/51         NTS         AIRDROP         NEAFONS RELATED           11/20/51         NTS         AIRDROP         NEAFONS RELATED           11/105/51         NTS         AIRDROP         NEAFONS RELATED           11/105/51         NTS         AIRDROP         NEAFONS RELATED           11/10/51         NTS         SURFACE         NEAFONS RELATED	lui.	16/22/91		TOWER	WEAPONS RELATED	LESS THAN 6.1KT
IE         19/38/51         NTS         AIRDROP         MEAPONS RELATED           11/15/51         NTS         AIRDROP         WEAFONS RELATED           11/19/51         NTS         SURFACE         WEAFONS RELATED	*	15/82/01	HTS	AIRDROP	WEAFONS RELATED	3.5KT
11/15/51         HTS         AIRDROP         MEAFONS RELATED           11/19/51         HTS         SURFACE         MEAFONS RELATED	r. se	10/30/51	HTS	AIRDROP	MEAPONS RELATED	14KT
11/19/51 HTS AIRDROP WEAFONS RELATED 11/19/51 HTS SURFACE WEAFONS RELATED		11/81/51	HTS	AIRDROP	WEAFONS RELATED	2187
11/19/51 HTS SURFACE MEAPONS RELATED	_	11/08/21	NTS	ATROROP		3111
	=	11/19/51	HTS	SURFACE	WEAPONS RELATED	1.2KT

ANNOUNCED UNITED STATES NUCLEAR DETONATIONS

	K K	ANNOUNCED UNITED STATES MUCLEAR DETUNATIONS	KLEAK DETOR	ATIONS	
EVENT NAME	DATE (GCT)	LOCATION	TYPE	PURPOSE	VIELD RANGE
UNCLE	11/23/11	NTS OPERATION TUMBLER-SNAPPER	CRATER R	WEAPONS RELATED	1.2KT
ABLE	84/81/52	NTS	AIRDROP	WEAPONS RELATED	187
BAKER	14/15/52	MTS	AIRDROP	WEAPONS RELATED	18.1
CHARLIE	25/22/18	NTS	AIRDROP	WEAPONS RELATED	31.67
900	15/11/51	WTS	AIROROP	WEAPONS RELATED	1961
EASY	85/11/52	NTS	TOWER	WEAFONS RELATED	12KT
FOX	28/52/50	NTS	TOWER	KEAPONS RELATED	1187
CEONGE.	25/10/99	MTS	TOWER	NE APONS RELATED	1567
801	16/18/52	MTS ADEDATION 10V	TOWER	MEAPONS RELATED	14KT
HINE EXPERIMENTAL	18/31/52 THERMONUCLEGR	ENIMETOK DEVISE	SURFACE	WEAPONS RELATED	10.487
		ENINETOK	AT REDROP	WE APONS RELATED	500 KT
		OPERATION UPSHOT-KNOTHOLE			
Americ	83/11/63	*T\$	TOWER	HEAPONS RELATED	1647
MANCY	13/24/53	MTS	TOWER	NEAPONS RELATED	24.87
RUTH	13/31/53	HTS	TOWER	WEAPONS RELATED	0.2KT
DIXIE	04/66/93	273	AIROROP	NEAPONS RELATED	1117
RAY	14/11/63	NTS	TOWER	WEAPONS RELATED	0.2KT
DAGER	19/11/40	H73	TOWER	WEAPOUS RELATED	2347
SING	26/52/40	RTS	TONER	MEAPONS MELATED	4367
ENCORE	15/00/51	N75	AIROROF	NEAPONS RELATED	27117
HAMET	15/14/53	HTS	TOMER	MEAPONS RELATED	3247
CRABLE FINED FROM 28	65/25/53 FROM 2884H GWR	HTS	CUR	MEAPONS RELATED	1961
Ct. Time X	84/84/53	272	AIRBRO	MEANUMS MELATED	6117
BRANO		OPERATION CASTLE SIKENS	SURFACE	HEAPONS RELATED	1941
EKPERTMENTA,		MYTCE			

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EVENT NAME	DATE (GCT)	LOCATION	TYPE	PURPOSE	VIELD RANGE
RONEO	13/26/54	BIKINI	BARGE	NEAPONS RELATED	11 MT
KOON	15/91/11	BIKINI	SURFACE	HEAPONS RELATED	110 KT
UNION	16/52/10	DIKINI	BARGE	HEAFONS RELATED	6.9 MT
YANKEE	15/11/58	101×10	BARGE	WEAPONS RELATED	13.5 MT
MECTAR	05/13/54	ENIMETOK	BARGE	HEAPONS RELATED	1.69 MT
	٠	OPERATION TEAFUE			
HASP	55/91/28	MTS	AIRDROP	MEAPONS RELATED	11(1
моти	85/22/28	MTS	TOWER	WEAPONS RELATED	2KT
TESLA	13/11/55	MTS	TOWER	HEAPONS RELATED	7KT
TURK	93/01/55	MTS	TOWER	WEAFONS RELATED	43KT
HORNET	83/15/55	HTS	TOWER	WEAPONS RELATED	+KT
966	93/22/59	uts	TOWER	MEAFONS RELATED	BKT
ESS	13/23/56	STH STH	CRATER	MEAPONS RELATED	1167
APPLE-1	13/29:55	NTS	TOMER	WEAPONS RELATED	14KT
MASP PRINE	83/53/55	818	AIROROP	HEAPONS NELATED	384
₹#	14/16/55	NTS	ALROROP	HEAPONS RELATED	3KT
POST	14/19/55	MTS	TOWER	WEAPONS RELATED	2KT
HET	55/51/10	NTS	TOMER	NE SPONS RELATED	2247
APPLE-2	95/98/58	NTS	TOWER	WEAPONS RELATED	29KT
ZUCCHINI	85/15/58	NTS OPERATION NIGHAM	TOBER	WEAPONS RELATED	28%7
MIGNAM 29 DEGREESM-126 DEGREES	6 DEGREES N		35	HEAPONS RELATED	Ties.
		OPERATION REDKING			
LACROSSE	95/10/50	ENTHETOK	SURFACE	HEAPONS RELATED	F :
CHEACKEE FIRST AIR DROP	87.28/56 87 U.S. OF	BIKINI A THERMONUCLEAR WEAPON	A I R DROP	WEAPONS RELATED	SEVERAL NT
ZUMI	98/21/30	DIKIMI	SURFACE	HEAFONS RELATED	3.5 HT
YUNA	95/12/50	ENTHETOK		HEAPONS RELATED	

ANNOUNCED UNITED STATES NUCLEAR DETONATIONS

EVENT NAME:	DATE (GCT)	LOCATION	TYPE	PURPOSE	YIELD RANGE
ERIE	05/30/56	ENIMETOK	TOWER	HEAPONS RELATED	
SENINOLE	95/90/90	ENIWETOK	SURFACE	WEAPONS RELATED	
FLATHEAD	98/11/98	BIKINI	BARGE	WEAFONS RELATED	
BL ACKFOOT	86/11/56	ENINE	TOWER	MEAPONS RELATED	
KICKA POO	1,13/56			WEAFONS RELATED	
DSAGE	£-,16 .	ENINETOK	AIRDROP	WEAFONS RELATED	
INCA	86/21/56	ENINETOK		MEAPONS RELATED	
UAKOTA	86/22/38	BIKIMI	BARGE	WEAPONS RELATED	
HOHANK	95/20/10	ENTWETOK		MEAPONS RELATED	
APACHE	95/00/10	ENINETOK	BARGE	ME APONS RELATED	
#AVAJO	91/11/19	BIKINI	BARGE	WEAPONS RELATED	
TENA	81/28/56	BIKINI	BARGE	WEAPONS RELATED	5 81
HURGH	87/21/56	ENIWETOK	BARGE	HEAPONS RELATED	
		OPERATION PLUMBBOB	<b>6</b> 0		
BOLTZHAN	15/52/51	NTS	TOWER	WEAFONS RELATED	12KT
FRAMELIN	16/18/151	MTS	TOWER	WEAPONS RELATED	1401095
LASSEN	16/69/51	NTS	BALLOOM	WEAFONS RELATED	8.5 TOMS
WILSOW	16/10/57	NTS	BALLOOM	WEAFONS RELATED	1987
PRISCILLA	16/24/57	MIS	BALLOOM	WEAPONS RELATED	37KT
900H	18/50/18	MTS	841100#	MEAPONS RELATED	74KT
DIAMO	15/5/11	MTS	TOWER	HEAPONS RELATED	1711
3011	15/11/10	MTS	ROCKET	WEAPONS RELATED	ABOUT 2KT
KEPLER	17/24/57	MTS	TOWER	WEAPONS RELATED	1961
<b>DME</b> HS	15/52/10	HTS	841100#	NEAPONS RELATED	9.747
SYDRES	15/10/00	MTS .	SALLOOM	HEAPONS RELATED	2947
SHASTA	15/01/00	272	TOWER	NEAPONS RELATED	174
DOPPLER	15/22/10	<b>218</b>	8ALL 00#	WEAPONS RELATED	1167

EVENT MANE	AATF (GCT)	LOCATION	TYPE	PURPOSE	YIELD RANGE
FRANCLIN PRINE	18/33/57	NTS	BALLOOM	WEAPONS RELATED	6.7KT
SHOKY	08/31/57	HTS	TOWER	WEAPONS RELATED	****
GALILEO	15/20/60	215	TOWER	WEAPONS RELATED	11KT
WEELER	15/91/66	NTS	BALLOOM	WEAPONS RELATED	197 TOMS
LAPLACE	15/11/60	MTS	BALLOOM	WEAPONS RELATED	141
FIZEAU	15/11/68	STR	TOWER	WEAPONS RELATED	1117
WENTOF	15/91/60	RTS.	BALLOOM	WEAPONS RELATED	1217
RAINIER FIRST TUNNEL	89/19/57 EMPLACEMEN	STM	TURNEL	WEAFONS RELATED	1.747
METNEY	15/23/60	NTS	TOWER	WEAPONS RELATED	19KT
CHARLESTON	125/82/61	RTS	BALLOOM	WEAPONS RELATED	12KT
MORGAW	19/01/91	MTS	BALLOON	WEAPONS RELATED	914
		OPERATION HARDTACK I			
YUCCA 84/28/56 12 DEGREES 37 MIM M-163		DEGREES OI HIN E	BALLOOM	WEAPONS RELATED	
CACTUS	15/11/51	ENTHETOK	SURFACE	HEAFONS RELATED	19 87
FIR	05/11/50	BIKINI	BARGE	WEAPONS RELATED	
BUTTERNUT	05/11/50	ENINETOK	BARGE	WEAPONS RELATED	
KOA	16/11/30	ENTWETOK	SURFACE	WEAFONS RELATED	1.37 NT
MAHOO	15/17/51	ENINETOK	35	WEAPONS RELATED	
HOLLY	18/12/51	ENTWETOK	BARGE	NEAPONS RELATED	
NUTHEG	05/12/50	SIKINI	BARGE	NEAFONS RELATED	
VELL OUR OOD	05/92/50	ENTWETOK	BARGE	HEAPONS RELATED	
HAGNOL TA	08/92/50	ENTHETOK	BARGE	HEAPONS RELATED	
TOBACCO	98/30/80	ent we tok	BARGE	HEAPONS RELATED	
SYCANORE	08/31/80	DIKINI	BARGE	WEAPONS RELATED	·
ROSE	96/28/98	ENTWETOK	BARGE	HEAPONS HELATED	
DHBAELLA	96/99/98	ENIMETOK	3	HEAPONS RELATED	

ANNOUNCED UNITED STATES NUCLEAR DETONATIONS

EVENT NAME DATE (GCT)	LOCATION	TVPE	3504204	VIELO RANGE
06/10/20	BIKIMI	BARGE	WEAPONS RELATED	
16/11/50	BIKINI	35848	MEAPONS RELATED	
96/11/29	ENTWETOK	BARGE	WEAFOWS RELATED	
86/11/99	ENTWETOK	bu RGE	HEAPONS RELATED	
36/27/98	BIKINI	BARGE	WEAPONS RELATED	
96/21/98	ENTWETOK	BARGE	HEAFONS RELATED	
86/29/28	ENIMETOK	BARGE	WEAPONS RELATED	11 6.0
16/52/91	BIKINI	BARGE	WEAPONS RELATED	
11/11/50	ENINETOK	BARGE	MEAFONS RELATED	
81/82/58	BIKINI	BARGE	WEAPONS RELATED	
85/58/28	ENTWETOK	BARGE	WEAPONS RELATED	
87/15/58	BIKINI	BARGE	HEAPONS RELATED	
61/11/20	ENTWETOK		HEAPONS RELATED	
81/22/28	BIKINI	BARGE	HEAPONS RELATED	
85/22/18	ENTWETOK	BARGE	HEAPONS RELATED	
81/56/50	ENTWETOK	BARGE	WEAFOWS RELATED	
19/11/88	JOHNSTON ISL AREA	ROCKET	WEAPONS RELATED	HEGATON RANGE
86/99/88	ENTHETOK		WEAPONS RELATED	
08/15/80	JOHNSTON ISL AREA	ROCKET	WEAPONS RELATED	MEGATOR RANGE
09/11/00	ENIMETOK		WEAPONS RELATED	
ARGUS I 80/27/56 ABGUT 389 MELES ALTITUDE	SOUTH ATLANTIC	ROCKET	NEAPONS RELATED	1-247
08/38/58 308 MEES ALTITUDE	SOUTH ATLANTIC	ROCKET	HEAPONS RELATED	1-241
ARGUS III 69/86/56 ABOUT 300 MILES ALTITUDE	SOUTH ATLANTIC OPENATION MADIACK II	ROCKET	HEAPONS NELATED	1-84
84/14/20	£1	891108	SEAPONS RELATED	63 1003

ANNOUNCED UNITED STATES NUCLEAR DETONATIONS

EVENT NAME	DATE (GCT)	LOCATION	341	PURPOSE	VIELD RAWGE
HORA	95/62/68	MTS	BALLOON	HEAPONS RELATED	ZXL
TANALPAIS SLIGHT VENTING	19/09/01	#1\$	TURNEL	MEAPONS RELATED	27 TONS
Cha7	16/11/11	MS .	TOWER	NEAPONS RELATED	79 1045
LEA	16/11/11	MTS	BALLOOM	WEAPONS RELATED	1.647
HANTLTON	10/12/58	MTS.	TONER	NEAFONS RELATED	1.2 TONS
LOGAR	19/16/58	MTS	TUNNEL	NEAPONS RELATED	SKT
DOMA ANA	10/16/50	NTS .	BALLOOM	HEAPONS RELATED	37 TONS
RIO ARRIBA	13/11/61	MTS	TOWER	WEAPONS RELATED	96 TOUS
SOCORRO	18/22/11	213	BALLOOM	WEAPONS RELATED	<b>6</b> K7
HAMSELL	19/22/61	STN	NOO TIVE	HEAPONS RELATED	115 TORS
RUSHBORE	10/22/91	HTS	BALLOON	WEAPONS RELATED	166 TOMS
SALFORD	18/55/58	HTS	BALLOON	HEAPONS RELATED	6.9KT
DE BACA	18/26/58	HTS	BALLOOM	HEAPONS RELATED	2:2KT
EVANS VENTING	10/29/58	XTS	TURNEL	NEAPONS RELATED	55 TONS
HUMBOLDT	15/62/51	#T\$	TOWER	WEAPONS RELATED	7.8 1985
SANTA FE	19/38/50	MTS	BALLOOM	NEAPORS RELATED	1.847
BLANCA CLICHT MEETING	10/30/56	213	TUMMEL	WEAPONS RELATED	1917
		OPERATION NOUGAT	GAT		
ANTLER	19/11/60	MTS	TURNEL	WEAPONS RELATED	2.687
SHEN TELO HEARS LESS THAN		HTS 28KT	SHAFT	MEAPONS RELATED	#07
CHENA	19/11/01	HTS	TUNNEL	WEAPOWS RELATED	101
#11eK	19/52/01	818	ZHAFT	HEAPONS RELATED	161
FISHER	15/88/21	#15	SHAFT	WEAPONS RELATED	13.5KT
CHOICE HULTIPLE-PURPO	22/10/61 SE EXP.RINENT	SMAFT PLE-PURPOSE EXP. RINENT IN SALT.FORMED CAVITY 161-178 FT. DIAMETER	SMAFT VITV 168-178 FT.	plonghare Blaneter	3.117
ESTRUPL DOIDO					

EVENT NAME	DATE (GCT)	•	LOCATION	TYPE	PURPOSE	VIELD RANGE
***	15/11/21	NTS		SHAFT	WEAPONS RELATED	0.4367
RINGTAIL	12/11/21	HTS		SHAFT	MEAPONS RELATED	101
FEATHER	15/22/21	XTS		TURKEL	HEAPONS RELATED	707
STOAT	23/60/70	MTS.		SHAFT	HEAPONS RELATED	4.5KT
AGOUTI	29/11/10	NTS		SHAFT	HEAPONS RELATED	5.947
DOCHOUSE	29/05/10	MTS		SHAFT	HEAFONS RELATED	101
STELLMATER	29/09/20	MTS		SHAFT	HEAPONS RELATED	2.710
ARMADILLO	29/69/20	NTS		SHAFF	HEAPONS RELATED	6.647
HARDHAT Granite	29/51/20	NTS		SHAFT	WEAFORS RELATED	5.947
CHINCHILLA	29/61/21	MTS		SHAFT	WEAPONS RELATED	1.047
COOSAN	29/61/20	MTS		SHAFT	NEAPONS RELATED	781
CIMARRON	29/82/20	NTS		SHAFT	MEAPONS RELATED	11.241
PLATYPUS (	29/52/28	MTS		SHAFT	HEAPONS RELATED	201
PAMPAS	03/01/62	MTS		SMAFT	JOINT US-UK	101
DAMIN BOY 03/05/62 CRATER DIANETER 265 FT.		NTS PEPTH 84	HTS DEPTH 84 FT. IN BASALT	CRATER	NEAPONS RELATED	1.42KT
Emine	13/106/62	NTS		SHAFT	MEAPONS RELATED	5
88.420\$	13/00/62	HTS		SHAFT	HEAPONS RELATED	7.647
3548204	29/12/12	MTS		SMAFT	NEAPONS RELATED	201
H0051C	93/20/62	MTS		SHAFT	HEAPONS RELATED	387
CHINCHILLA II	93/33/62	MTS		SHAFT	HEAPONS NELATED	101
DORNOUSE II	29/68/48	STR		SHAFT	HEAPONS RELATED	1087
PASSAIC	29/90/10	ETS.		SHAFT	NEAPONS RELATED	5
1050111	29/21/00	E STE		SHAFT	NEAPONS AFLATED	<b>3</b>
PLATTE 1	34/1/162	ST#		TUMBEL	HEAPONS RELATED	1.767
DEAD	29/12/*0	Z E		SHAFT	HEAPONS RELATED	3

EVENT NAME	DATE (GCT)	062 PACIFIC TESTS NEEDS OFSIGNATED OPERATION CONTRIC	TYPE	PURPOSE	VIELD RANGE
ADOBE INTERNEDIATE N	84/25/62 MEANS 28 TO 18	CHRISTNAS ISL AREA	AIRDROP	HEAPONS RELATED	INTERNEDIATE
AZTEC	84/27/62	CHRISTHAS ISL AREA	AY RDROP	MEAFONS RELATED	INTERNEDIATE
BL ACK	84/27/62	NTS	SHAFT	HEAPONS RELATED	707
ARKANSAS	85/02/62	CHRISTMAS ISL AREA	AIROROP	HEAPONS RELATED	LOW MEGATON
DUESTA	29/10/50	CHRISTHAS ISL AREA	ATRORDE	WEAPONS RELATED	INTERNEDIATE
FRIGATE BIRD NARHERD IN HIS	09/06/62 IN MISSILE LAUNCHED	CHRISTMAS ISL AMEA FROM POLARIS SUBMARINE	HISSILE	WEAFONS RELATED	
PACA	29/19/59	MTS.	SHAFT	WEAFONS RELATED	101
YUKON	19/11/62	CHRISTMAS ISL AREA	AIRDROP	HEAPONS RELATED	INTERNEDIATE
MESILLA	29/60/50	CHRISTHAS ISL AREA	AIRDROP	HEAPONS RELATED	INTERMEDIATE
MUSKEGON	85/11/62	CHRISTHAS ISL AREA	AIRDROP	WEAFONS RELATED	INTERMEDIATE
SWORDFISH ANTISUBHARINE	85/11/62 80CKET /ASR0C/	EASTERN PACIFIC / SYSTEM PROOF TEST	5	WEAPONS RELATED	707
ENCINO	05/12/62	CHRISTHAS ISL AREA	AIRDROP	MEAFONS RELATED	INTERNEDIATE
AARDVARK	19/21/50	MTS	SHAFT	WEAPONS RELATED	38KT
SHANEE	85/14/62	CHRISTHAS ISL AREA	AIRDROP	MEAPONS RELATED	INTERMEDIATE
EFL	85/19/62	HTS	SHAFT	HEAPONS RELATED	707
CHETCO.	19/11/65	CHRISTMAS ISC AREA	AIROROP	WEAPONS RELATED	INTERMEDIATE
MHITE	85/25/62	MTS	SHAFT	WEAFONS RELATED	707
TAMAME	19/52/50	CHRISTMAS ISL AREA	AIROROP	WEAPONS RELATED	707
NA MBE	85/27/62	CHRISTHAS ISL AREA	AIROROP	WEAPONS RELATED	INTERMEDIATE
RACCOOK	29/10/96	HTS	SHAFT	WEAFONS RELATED	707
PACKAT.	29/90/91	MTS	SHAFT	MEAPONS RELATED	707
ALMA	29/06/91	CHRISTHAS ISL AREA	AIROROP	NEAPONS RELATED	INTERNEDIATE
TRUCKEE	29/68/98	CHRISTHAS ISL AREA	AIRDROP	HEAPORT RELATED	INTERNEDIATE
VESO	16/18/62	CHRISTMAS ISL AREA	AIRDROP	WEAPONS RELATED	LON MEGATON
HARLEN	86/12/62	CHRISTNAS ISL AREA	AIROROF	NEAPONS RELATED	INTERNEDIATE

EVENT MANE	DATE (GCT)	T) LOCATION	TYPE	PURPOSE	VIELD RANGE
DES HOTHES	29/11/90	ETS.	TUNNEL	WEAPONS RELATED	101
RINCOMADA	29/51/90	CHRISTHAS ISL AREA	AIROROP	WEAFONS RELATED	INTERNEDIATE
DULCE	16/11/62	CHRISTHAS ISL ANEA	AIRDROP	MEAPONS RELATED	INTERNEDIATE
PETIT	29/61/98	CHRISTHAS ISL AREA	AIRDRO	WEAPONS RELATED	101
DAMAN I	16/21/62	nTS	SHAFT	WEAPONS RELATED	101
010MI	29/22/98	CHRISTHAS ISL AREA	AIROROP	HEAFONS RELATED	INTERNEDIATE
пенови	29/22/98	CHRISTHAS ISL AMEA	AIRDROP	WEAPONS RELATED	HEGATON RANGE
HAVNAKER	16/27/62	MTS	SHAFT	HEAPONS RELATED	56KT
HARSHWALLOW DOS EVENT	29/82/90	RTS	TUNKEL	WEAPONS RELATED	<b>101</b>
BLUES TONE	29/38/65	CHRISTHAS ISL AREA	AIRDROP	WEAPONS RELATED	LOW REGATOR
SACKAMENTO	86/33/62	HTS	SHAFT	WEAPONS RELATED	101
		OPERATION STORAX			
SEDAN CKGAVATION EXPI	47/86/62 ERINENT-CR	47/06/62 NTS CRATER PLONSHARE EXPERIMENT-CRATER 1260 FT.OLAM 320 FT.OEEP-THERMONUCLEAR DEV.	Crater T. Deep-therhonu	PLOWSHARE CLEAR DEV.	100KT
LITTE FELLERII SLICHTLY ABOVE	\$7/87/62 GROUND.	MTS DOMINIC II SERIES.	SURFACE	WEAPONS RELATED	101
STARFISH PRIME 87/89. Mism altitude-450 km	87/89/62 450 KM	JOHNSTON ISL PAEA	ROCKET	WEAPONS RELATED	1.4 MEGATOWS
SUMBET	87/11/62	CHRISTHAS ISL AREA	AIROROP	HEAPONS RELATED	INTERMEDIATE
PAMLECO	47/11/62	CHRISTMAS ISL AREA	AIRDROP	HEAPONS RELATED	LOW MEGATOW
JOHNIY BOY	87/11/62 GROUND.	MTS DOWINIC II SERIES.	SURFACE	WEAPORS RELATED	•••
HERRIMAC	29/21/18	MTS	SHAFT	HEAPONS RELATED	767
SMALL, BOY SLIGHTLY ABOVE	87/14/62 SROUND.	MTS DOMINIC II SERIES.	SURFACE	NEAPONS RELATED	<b>101</b>
LITTLE FELLER 3 TROOP PARTICIPA	67/17/62 ATTOM. SLE	1CIPATION. SLIGHTLY ABOVE GROUND. BOWINIC II SERIES.	SURFACE INIC II SERIES.	MEAPONS RELATED	
WICHITA	01/21/62	MTS	SHAFT	HEAPONS RELATED	100
YORK	29/52/00	MTS	SHAFT	NEARONS RELATED	707
27608	29/92/88	uts	SKAFT	NE A PONS REL A TED	

DETONATIONS
NUCLEAR
STATES
UNITED
NOUNCED

VIELO RANGE	<b>*</b>	<b>3</b> .	*	INTERMEDIATE	118 KT			LOW WEGATON			SUBMEGATON		INTERNEDIATE	HEGATON RANGE	SUBMEGATON	7				
	LOM	LOW	10M	H	11	101	10	2	2	200	S	101	H		2	3	201	3	3	100
PURPOSE	WEAFGNS RELATED	MEAFONS RELATED	WEAFONS RELATED	WEAPONS RELATED	WEAFONS RELATED	WEAPONS RELATED	WEAPONS RELATED	HE APONS RELATED	WEAPONS RELATED	MEAPONS RELATED	WEAPONS ŘELATEG	MEAPONS RELATED	WEAPONS RELATED	WEAPONS RELATED	WEAPONS RELATED	WEAPONS RELATED	Æ	3-UK	WEAPONS RELATED	WEAPONS RELATED
PUR	WEA FONS	ME A FONS	WEA FONS	WEAPONS	WE A FONS	WE A PONS	WE A PONS	HE A PONS	WE A PONS	MEAPONS	WE A PONS	WEAPONS	WE A PONS	MEAPONS	WEA POWS	ME A PONS	PL OWSHARE	JOINT US-UK	WE A PORTS	MEAPORS
TYPE	SHAFT	SHAFT	SHAFT	AIROROP	SHAFT	AIROROP	SHAFT	AIROROP	SHAFT	ROCKET	ROCKET	SHAFT	AIRDROP	AIRDROP	ROCKET	ROCKET	SHAFT	SHAFT	TUMBEL	SHAFT
_				AREA		AREA		AREA		AREA	AREA		AREA	AREA	AREA	AREA				
LOCATION				151		ISL		151		151	ISL		ISL	ISL	ISL	181				
201	NTS	NTS	NTS	JOHNSTON ISL AREA	HTS	JOHNSTON ISL AREA	HTS	JOHKSTON ISL AREA	NTS	JOHNSTON ISL	JOHNSTON ISL AREA	HTS	JOHNSTON ISL	SOHNSTON	JOHNSTON ISL	JOHNSTON ISL	NTS	MTS	NTS .	MTS
E										KHS	KHS				KMS	KHS				
DATE (GCT)	39/11/62	29/52/68	29/52/61	18/82/62	18/65/62	11/16/62	10/12/62	10/18/62	11/19/62	18/20/62 - TENS OF	10/26/62 - TENS CF	10/27/62	10/27/62	18/38/62	11/01/62 - TENS OF	11/04/62 - TENS CF	11/27/62 MENT	12/07/62	12/12/62	12/12/62
EVENT MANE	HYRAX	PEBA	ALLEGHENY	ANDROSCOGGIN	HISSISSIPPI	BUMPING	ROANOKE	CHAMA	BANDICOOT	CHECKHATE HIGH ALTITUDE	BLUEGILL 3PRIME MIGH ALTITUDE	SANTEE	CALANITY	HOUSATONIC	KINGFISH HIGH ALTITUDE	TIGHTROPE HIGH ALTITUDE	AMAGOSTIA 11/27/62 DEVICE DEVELOPMENT	TENDRAC	MADISON	HIMBAT

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Since 1955, the U.S. Atomic Energy Commission has conducted a number of safety experiments at the Nevada Test Site to determine the safety of nuclear weapons in case of accident. The following list includes those experiments which resulted in a measurable nuclear yield.

			0.3 KT	Slight yield	15 T 1.5 T 1.5 T 1.7 T 5.5 T 5.5 T 15 T 16 T 17 T 18 T 18 T 19 T	
Heix		900000000000000000000000000000000000000	0.3 ET	0.5 KT	7,500 5,500 15 T Low diffuse cloud 1.5 T Low diffuse cloud 1.3 T Shot vented tames 1.2,000 8,000 7.7 T	5,000 24 T 21 T .
(Feet)	Tropo- pause		80,000		5,500 ffuse cloud ffuse cloud 8,000	\$ 500 \$,000 \$.000
Mean Sca Level (Feet)	Cloud Base		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		,500 5,500 500 diffuse cloud Low diffuse cloud 600 8,000 600 4,500 600	5,00
Hean	Cloud Top		5,000 18,000		5,500 12,000 12,000 12,000 11,000	_
Type of	Burst	Nevada Surface	UG 5,000 Surface 18,000	Vertical shaft Slight yield Surface O.5 KT	00	Surface Tover Surface Tower Tower Tower
Height of Burst			Nevada	revada	484 484 484 484 484 484 486 486 486 486	; ;
Location of	SNOT	Nevada	Nevada	Pevada	Nevada Nevada Nevada Nevada Nevada Nevada	Nevada Nevada Nevada Nevada Nevada
Time		2130	2005	2015	2000 1930 1900 2000 0000 1410 1615	2300 1500 1601 0400 1430
Date	( <u>)</u>	18/01/56	26/07/57 6/09/57	6/12/57	12/09/58 17/09/58 21/09/58 26/09/56 28/09/58 5/10/58 5/10/58	17/10/58 24/10/58 24/10/58 26/10/58 27/10/58
Name		1956 18/01/56	Pascal A 26/07/57 Coulomb B 6/09/57	Pascal C Couloub C	Otero 12/09/58  Mermalillo - 17/09/58  Valencia 23/09/59  Valencia 26/09/59  Mars 28/09/59  Hidalgo 5/10/58  Colfax 5/10/58  Nortune 1/19/58	Vesta Catron Juno Ceres Chavez Titania

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